КОНТРОЛЬНА РОБОТА №30

Translate into Ukrainian

ALCOHOLS AND ETHERS

Alcohol has very extensive uses, apart from its historic employment as a beverage.

An alcohol is obtained from a hydrocarbon by replacing one hydrogen atom by a hydroxyl group,—OH. Thus, methane, gives methyl alcohol, or methanol; ethane, gives ethyl alcohol, or ethanol. The names of the alcohols are often written by using the ending **ol.**

Methyl alcohol is sometimes called wood alcohol. It is made by the destructive distillation of wood. It is a poisonous substance which on ingestion causes blindness and death. It is used as a solvent and for the preparation of other organic compounds. Alcohol, as used in the industries, is denatured, or rendered unsuitable for drinking purposes, by addition of small quantities of benzine, pyridine bases, or other disagreeable and non-re movable organic liquids. The exact formula of denatured alcohol depends upon the use for which it is intended.

The most important method of making ethyl alcohol is by the fermentation of sugars with yeast. Alcohol is formed as a result of the fermentation of sugar and is therefore obtainable from practically any fruit or from any starchy matter through conversion of the starch into sugar. The usual raw materials for this purpose are grains, potatoes, and molasses. Grain alcohol is used in many industries as a solvent and finds its way into most extracts, perfumes, antiseptics and fluid medicines.

All the compounds containing the group are classified as primary alcohols.

All parts of the world make and use alcoholic liquors. Distilled liquors contain more alcohol than fermented drinks. It is worth remembering that alcohol is the chief among the common substances injurious to the nervous system.

The ethers are compounds obtained by condensation of alcohols with elimination of water. The most important ether is diethyl ether or ordinary ether. It is made by treating ethanol with concentrated sulphuric acid. The acid serves here as a dehydrating agent. It is used as a general anaesthetic, and is a solvent.

There is also an important aromatic alcohol — phenol. It is obtained from benzene by replacing one hydrogen atom by a hydroxyl group. It is a bactericidal agent, used as a disinfectant.

Phenol is an extremely poisonous, colourless, crystalline compound, obtained by the distillation of coal tar, and converted, by the addition of ten per cent of water, into a clear liquid. It has a peculiar odour and a burning taste.

The word phenol is used as a generic term for any organic .compound containing one or more hydroxyl groups attached to an aromatic or carbon ring.

The alcohols and ethers represent the first stage of oxidation of hydrocarbons. Further oxidation leads to substances called aldehydes and ketones.

The compounds containing the group CHO are aldehydes. The ketones contain the carbonyl group CO.

The simplest aldehyde is formaldehyde. It can be made by passing methyl alcohol vapour and air over a heated metal catalyst. It is a gas with a sharp, irritating odour. It is used as a disinfectant and an antiseptic. It is also used in the manufacture of plastics, leather, and artificial silk.

A similar substance can be made from ethyl alcohol — acetaldehyde, (acetic aldehyde).

The ketones contain a carbonyl group; CO with two hydrocarbon groups attached. They are effective solvents for organic compounds and in chemical industry they are used extensively for this purpose.

The simplest and most important of these substances is acetone, which is dimethyl ketone. It is a colourless liquid with a pleasant ethereal odour. It is acrid and inflammable and is used as a solvent for fats, resins; rubber, and plastics.

Acetone is found in small quantities in normal urine, it occurs in larger amounts in diabetic urine.

EXERCISES

I. *Answer the following questions*:
1. How is alcohol obtained?
2. How is methyl alcohol sometimes called?
3. What kind of a substance is methyl alcohol?
4. What does denatured alcohol mean?
5. What is the most important method of making ethyl alcohol?
6. What are the usual materials for making ethyl alcohol?
7. How is ethyl alcohol sometimes called?
8. What are the uses of ethyl alcohol?
9. What are primary alcohols?
10. Why is alcohol considered as an injurious substance for man?
11. How are ethers obtained?
12 How is ordinary ether used?
13. How is phenol obtained?
14**.** What do alcohols and ethers represent?
15. What are aldehydes?
16. What are ketones?
17. Which is the simplest aldehyde?
18. What are the uses of formaldehyde?
19. What kind of a substance is acetone?
20. Does normal urine contain acetone?

II. *Give the opposites of*:

Addition	remember
Find	concentrated
Disagreeable	first
Primary	artificial

Spell the above words.

III.*Give as many words as possible with the non prefix*:
non-metal, …

IV.*Fill in the missing words*:

I.Wood alcohol is a poisonous substance which ... ingestion causes ... and ....
2. Denatured alcohol is ... ... drinking purposes.
3. Ethyl alcohol is ... ...practically any fruit or—any starchy matter ... conversion... the starch ... sugar.
4. It is worth ... that alcohol is injurious...the nervous system.
5. Ordinary ether is made ... treating ethanol ... concentrated sulphuric acid.
6. Phenol is obtained ... benzene ... replacing one hydrogen atom ... a hydroxyl group 7.Formaldehyde is used ... the manufacture ... plastics, artificial silk and many
other things.
8. The ketones are effective solvents ...organic compounds.
9. Acetone is used as a solvent and it is ....
IO. The names ... the alcohols are often written ... using the ending ….

VI. *Suggestions for Composition Exercises (5-10 sentences each):*
1. Alcoholic liquors.
2. Ether — a general anaesthetic.
3. Ventilation in the chemical laboratory.
4. My experience as a patient in a surgery ward.
5. Dreams and reality.

Translate into Ukrainian. Put 10 questions to the text.

INFLUENZA

Influenza is an acute infectious and contagious disease occurring in endemic, epidemic or pandemic form. The cause of influenza is now definitely established; it is a filterable virus.

The main mode of dissemination is droplet infection, spread directly, from person to person by talking, coughing or sneezing. The porta of entry is usually the respiratory tract. Healthy carriers, as well as patients, probably spread the disease.

Great pandemics sweep the world at irregular intervals, each pandemic being composed of three distinct waves separated by months or a year; the second wave is the most severe. Severe pandemics occured in 1781, 1832, 1847, 1889 and 1918. They start from a definite geographical focus of from definite geographical foci, and spread rapidly throughout the world.

Between pandemics the disease is universally endemic, and from time to time localized epidemics occur. It is assumed that a population comprised chiefly of non-immune individuals gradually develops between pandemics, and that dissemination is inevitable when a virulent infectious agent is introduced. A localized epidemic lasts only from 3 to 6 weeks, the peak incidence occurring during the winter, when respiratory infections are most prevalent. Sporadic cases occur in any season.

No age is exempt, the disease being ordinarily most prevalent between the ages of 10 and 40 years; but during the pandemic of 1918-1920 children between the ages of 5 and 9 years were often affected. Many cases of mild upper respiratory infection are erroneously called influenza. An attack may confer some immunity but recurrences are common.

The incubation period is from 1 to 3 days. The onset is sudden with chilly sensations or a true chill, followed by fever. Common symptoms are severe frontal headache, pains in the back, limbs and eyeballs, dizziness, anorexia, conjunctivitis and severe prostration. The temperature ranges between 100° and 104°F. (37.7°-40°C.), or more, and persists from 2 to 5 days. The respiratory rate is moderately increased. The pulse rate is accelerated but usually not in proportion to the fever. Constipation and oliguria are common. In children, vomiting and diarrhoea are not infrequent. Many but not all patients also have respiratory symptoms, such as laryngitis, tracheitis and bronchitis. In cases where complications do not set in physical signs are scanty. The patient is apathetic, with a suffused face and injected conjuctivae. The tongue is dry and coated, the pharynx usually reddened. In some cases catarrhal symptoms are replaced by nervous symptoms of profound prostration, insomnia, mental depression, intense headache and general pains.

A few patients, mainly children, have predominating gastrointestinal symptoms of vomiting, constipation or diarrhoea, and abdominal pain, but the diagnosis of intestinal flu should be made with extreme caution. The leukocyte count may be slightly increased at first but a normal count or leukopenia with relative lymphocytosis is the rule. A leukocytosis usually indicates a complication.

The most common serious complication is pneumonia, which usually follows rather than accompanies the disease. It is usually a form of bronchopneumonia due to any of the secondary invaders (pneumococcus, the hemolytic streptococcus and *Staphy-lococcus aureus).* These secondary invaders are common in pandemic and epidemic influenza.

Influenza in which no complications arise usually lasts from 2 to 3 days, rarely more than 5. Convalescence may be prompt or protracted by weakness or mental depression. The mortality is low in

the epidemic and endemic forms but may be quite high in pandemics. Extreme toxemia sometimes produces peripheral circulatory failure. Bad signs are cyanosis, severe dysponea, excessive tachycardia, and rapidly falling blood pressure.

Treatment. Prophylactic. Isolation is theoretically plausible but of little practical value. Avoidance of crowds during epidemics and pandemics is advisable. Fatigue, exposure to cold and wet, and excesses should be avoided.

Curative. Treatment of the patient is symptomatic and supportive. Bed rest is essential. Fluids should be administered freely nutrition maintained by means of a bland diet, and constipation obviated by the use of enemata or mild laxatives. Symptoms requiring treatment are headache, sore throat, excessive rough, restlessness and insomnia. The headache and general pains are alleviated by the use of acetylsalicylic acid (aspirin) in doses of 0.5 g 4 times a day with or without phenacetin in doses of 0.3 g- Codeine sulfate in doses of 15 or 30 milligrams every 4 hours may be required for the cough.

КОНТРОЛЬНА РОБОТА№31

Translate into Ukrainian

THE ORGANIC ACIDS AND THEIR ESTERS

The organic acids represent a still higher stage of oxidation of hydrocarbons than the aldehydes and ketones. Any carbon compounds containing one or more carboxyl groups —COOH are known as organic acids. The carboxyl group has the properties of weak acid.

The simplest organic acid is formic acid. It can be made by distilling ants. Its name comes from the Latin word for ant.

The second member of the homologous series of carboxylic acids is acetic acid. It is the acidic constituent of vinegar.

Vinegar (crude acetic acid) is manufactured by oxidizing alcohol with atmospheric oxygen, using a bacterium (B.Aceti,"mother of vinegar"), or more probably an enzyme which it secretes, as a contact agent. The dilute alcohol, in the form, for example, of "hard" cider (fermented apple juice), is allowed to trickle over shavings in a barrel. The shavings are inoculated with the B. Aceti by preliminary wetting with vinegar. Holes in the sides admit a plentiful supply of air, to the action of the oxygen of which the liquid is exposed by being spread over the surface of the shavings.

The liquid (vinegar), which issues at the bottom, contains from 5 to 15 per cent of acetic acid, besides colouring and flavouring matters derived from the fruit juices.

Pure acetic acid may be prepared by distilling the vinegar repeatedly.

It is derived more cheaply, however, from the liquid distillate obtained by heating wood in the manufacture of charcoal. Large quantities are used in the manufacture of various synthetic products.

Some of the important organic acids occurring in nature: palmitic acid, stearic acid, oleic acid (a carboxyl group at the end of a long hydrocarbon chain).

Oxalic acid, which is a poisonous substance produced in the course of plant metabolism consists of two carboxyl groups bonded together. Oxalic acid converted into an insoluble form (calcium oxalate) is rendered harmless to the plants.

Lactic acid is a hydroxy-acetic acid. It contains a hydroxyl group as well as a carboxyl group. It is formed when milk sours and when cabbage ferments giving sour taste to milk and sauerkraut.

Tartaric acid, which occurs in grapes, is a dihydroxydicarboxylic acid. It is known in four forms: levo", dextro-, para- and mesotartaric acid.

Citric acid, a tribasic, crystalline acid, is a hydroxytricarboxylic acid. It occurs in citrus fruits (lemons, limes, etc.). It forms citrates. It is an antiscorbutic, a diuretic and refrigerant.

Esters

Alcohols and acids interact slowly and incompletely to form esters. Therefore, esters are the products of reaction of acids and alcohols. Thus when ethyl alcohol and acetic acid are used we obtain ethyl acetate. Ethyl alcohol and acetic acid react, with the elimination of water to produce ethyl acetate:

It is a volatile liquid with a pleasing, fruity odour. It is used as a solvent, especially in lacquers.

The esters form the sweet-smelling constituents (flavour and odour) of plants (flowers and fruits). They are used in perfumes and flavourings. Many are now produced synthetically as substitutes for natural flower and fruit essences. For example, the fragrance of ripe apples is due to minute amounts of the amyl esters of formic, acetic and caproic acids. In bananas the characteristic ester is amyl acetate.

The natural fats and oils are also esters (mainly of the trihydroxy alcohol glycerol).Animal fats consist mainly of the glyceryl esters of palmitic acid and stearic acid.Glyceryl palmitate and stearate form the solid fats. The glyceryl ester of oleic acid is glyceryl oleate and it is found in olive oil, whale oil, and in the fats of cold-blooded animals. These last mentioned fats tend to remain liquid at ordinary temperatures.

The chief chemical property of the fats and oils, and in fact of esters, is that each can be decomposed, or hydrolyzed, to give back the alcohol and acid from which it is derived. Thus, when ethyl acetate is boiled with water, it is slowly decomposed into ethyl alcohol and acetic acid.

When fat is boiled with sodium hydroxide (strong alkali), glycerine and sodium salts of the fatty acids, sodium palmitate, sodium stearate, and sodium oleate, are formed. These sodium salts (of the

fatty acids) are known as soaps and the operation is called saponification. The sodium palmitate or other sodium soap is soluble in water.

Soft soap is made with potassium hydroxide and is composed of the potassium salts of the organic acids.

There are many drugs (formerly obtained from natural sources) now built up in the laboratory and possess as valuable medicinal properties as any found in nature.For example, Aspirin is an ester of salycilic acid. It is acetylsalicylic acid, a white, crystalline compound, soluble in 1OO parts of water and in alcohol. Aspirin is an antipyretic and analgesic agent.

EXERCISES

I.*Answer the following questions*:

1. Which compounds are known as organic acids?
2. Which is the simplest organic acid?
3. What is vinegar?
4. How can we prepare pure acetic acid?
5. Do organic acids occur in nature? which?
6. Where do we find oxalic acid?
7. What is formed when milk sours?
8. What is the action of citric acid?
9. How are esters formed?
10. Which constituents of plants do the esters form?
11. Which esters are found in animal fats?
12. What is the chief property (chemical) of esters?
13. What is saponification?
14. What is aspirin?
15. When do we use aspirin?

II.*Give the opposites of*:

Wet	soluble	soft	
Plentiful	sour		solid
Cheap	sweet-smelling		secrete
Heating	cold-blooded	poisonous	

III. *Change the following sentences from active to passive voice*:

1. The assistant was preparing the test.
2. He is writing the paper.
3. He always asks me to correct his exercise.
4. Do the students understand the passive voice?
5. They were reading the exercises very quietly.
6. She was washing the test-tubes.
7. I am cleaning my laboratory bench.
8. He was drawing funny faces on the blackboard.
9. We are preparing pure acetic acid.
10. I am giving you a good piece of advice — review all the tenses.

IV. *Fill in the missing words*:

1. The word formic comes ... the Latin word ... ant.
2. Vinegar is manufactured ... oxidizing alcohol ... atmospheric oxygen using "mother ... vinegar".
3. Pure acetic acid may be prepared ... distilling the vinegar repeatedly.
4. Oxalic acid converted ... an insoluble form is rendered harmless …the plants.

5 Citric acid occurs ... citrus fruits.
6. Esters are used ... perfumes and flavourings.
7. Fats of cold-blooded animals tend to remain liquid ... ... ordinary temperatures.
8. There are many drugs now built ... ... the laboratory.
9. Soap is soluble ... water.
10. There are still many drugs obtained ... natural sources.
VI. *Suggestions for .Composition Exercises (5-10 sentences each):*
1. A visit in a vinegar factory.
2. Citrus fruits.
3. Chemists in perfume industry.
4. Ordinary soap and sea-water.
5. The fragrance in an orchard...

Translate into Ukrainian. Put 10 questions to the text.

POLIOMYELITIS

This is an acute infection, by poliomyelitis virus, of the anterior horn cells of the spinal cord and at times of the motor cells of the cerebrum or brain stem. The common name ,,Infantile Paralysis" is doubly misleading because the disease is not confined to infants or even to young children, and because it does not always paralyse. Though younger people are much more apt to contract it than older ones, it also occurs in people of all ages and all races appear to be equally succeptible. A name to be preferred is poliomyelitis which is usually shortened to „Polio".

The virus exists in three immunologic types but Type I is the one most commonly associated with epidemics. It is destroyed by strong oxidizing agents, by drying, and by heating at pasteurization temperatures. It belongs to the smaller viruses, measuring 30 mμ in diameter.

The first symptoms of polio are very like those of other infectious diseases, and this makes it difficult to recognize a case of polio with certainty in its earliest stages. When in the community there are no other known cases to cause a suspicion that a sick child may have polio, it may a first be thought to have some more common disease. On the other hand, during alarming epidemics many minor ailments may be mistaken for polio until their true nature becomes clear. In a very few instances, such characteristic symptoms as paralysis or muscular weakness may be the first to be noticed. But most cases have other symptoms for a few days before the nerves and muscles become appreciably affected.

The incubation period varies from 2 to 10 days. The onset is usually acute, sometimes preceded for a few hours or days by a prodromal period, in which vaque symptoms of malaise, abdominal pain or upper respiratory distress are complained of. Children become irritable and fretful, refuse food and sometimes vomit. Pains in the back, neck and head are especially common. The temperature usually rises but is seldom very high. Children often become drowsy and irritable, with a tendency to protest against being moved or disturbed in any way. The irritability is due to pain or tenderness in muscles, which are apt to contract painfully when they are moved or touched. Slight tremors or twichings of muscles occur, and while some muscles are becoming weakened, others contract in a painful spasmodic way. This tends to hold the affected parts in unnatural position; special care must be taken to prevent such contractures from becoming permanent.

If muscle weakness occurs, it usually comes three of four days after the beginning of the attack, and it varies greatly in extent and severity. It may effect only a single muscle, or a group of related muscles, or a large part of the body according to what parts of the nervous system are most affected in the individual patient. In some serious cases, involving the upper part of the spinal cord and the base of the brain, the muscles used in breathing may be weakened. This is the type of case for which the so-called "iron lung" is used.

Typical mild cases, which recover completely after a few days of illness, are known as cases of non-paralytic poliomyelitis. About half to three-fourths of the cases in different outbreaks are of this mild type; they are not accompanied by paralysis and have no after effects. Even among those cases which develop into actual paralysis, there are a considerable number of complete recoveries. The

proportion of paralyzed cases, which recover completely, varies from epidemic to epidemic; this proportion seems to be increasing in number as the result of improved methods of caring for patients.

When the acute symptoms subside weakened muscles begin to gain new strength. At first, the improvement is rapid and marked. After a few weeks, it goes on more slowly, though improvement continues for months. During this period the muscles may be strengthened by appropriate exercises and other methods of treatment; the degree of improvement is often surprising.

Despite the lack of ideal methods of curing polio, a great deal can be done to relieve the suffering it may cause, to minimize the damage it can do, and to restore the patient to an active life after the acute stage is over. This requires skilful treatment which should be started as soon as possible.

Most patients can be cared for better in hospitals than at home. In the last few years, the method of treating poliomyelitis in the acute stage has been modified somewhat, and the methods suggested by Sister Elizabeth McKenny of Australia have been studied carefully and have come somewhat into general use alongside the well-tried older methods.

In the above method, hot moist packs are applied continuously on the affected parts, to relieve pain and to prevent muscles from contracting spasmodically and drawing the limbs or other parts of the body into unnatural positions. Gentle, passive movements of the affected limbs are used. This keeps the joints movable and causes sensations which keep the patient "aware" of the weakened muscles and convince the patient that they are still under his control despite their weakness. It also maintains his confidence in his ability to move them later when there is need for him to use them voluntarily.

Other methods also are used to maintain "awareness" and prevent loss of muscle control. For example, it is helpful, when leg muscles are involved, to have the soles of the feet touch the footboard to maintain "awareness" and to maintain the normal position of the legs. Soft pads and pillows are used to protect and support sensitive parts. The patient is trained to complete all natural movements of weakened muscles and not to use healthy muscles instead in unnatural ways.

Though this method of treatment does not cure the disease, able physicians report that it makes patients much more comfortable and cheerful during the acute stage, that it prevents deformities and nearly every case leaves less paralyses than might be expected. To obtain the best results, the treatment requires the facilities of a hospital and the services of nurses and technicians well trained for this special kind of work.

In the convalescent stage, the patient still needs rest. Passive movements are continued, and methods of physical therapy with carefully regulated exercises are used for training and strengthening the muscles. Violent manipulations are harmful just as they are in the earlier stage. Even in the later stages, orthopaedic surgeons can be of great help to patients with deformities and paralysis. No specific therapy exists. The acutely ill patient with respiratory failure requires careful attention to fluid and electrolyte balance.

Prophylaxis. Individuals with mild fever and nonspecific symptoms should be carefully observed and kept in bed, or on reduced activity. Predisposing factors should be avoided — tonsillectomy (or any surgical procedure), routine immunization (e.g., diphtheria, pertussis, smallpox, tetanus) and overexertion and fatigue. During epidemics, pregnant women (particularly susceptible) and children should avoid unnecessary contact outside the home.

The current scientific belief is that polio virus enters the body through the mouth or nose. How it reaches the central nervous system is not certain. It is, possible, however, that in certain circumstances the virus gains access to the central nervous system via neural pathways. Besides lesions of the central nervous system, hyperplasia of lymph nodes is found at autopsy, and in some cases, myocarditis.

The hope of the world for an ultimate preventive of polio became real through the vaccine prepared by Salk and his team (Virus Research Laboratory at the University of Pittsburg, U.S.A.). Active immunization with formalin-treated Salk vaccine has been recommended for all individuals under 40 but particularly for young children. The vaccine is given intramuscularly in 3 doses of 1 cc. each. The second injection should be 1 month after the first; the last is given 7 to 8 months later. For children under 5, some recommend 1 additional monthly dose. Three to four years after the third injection at least one "booster" dose is recommended.

Purified poliomyelitis vaccine, prepared from formalin-inactivated polio virus, is a more potent and concentrated agent. It is said that is produces a higher incidence of immunity to poliomyelitis virus I and III. It is given in a dosage of 0.5 cc. subcutaneously or intramuscularly at intervals similar as for the Salk vaccine. In many countries oral vaccination with attenuated strains of the three types of polioviruses is currently being used. The vaccine, beginning with Type I, then Type 111, and lastly Type II, is given in three doses, 4 to 6 weeks apart.

Another vaccine consisting of living strains of poliovirus prepared by Koprowski (U.S.A.) is also in use and it also proved to be very effective. At present the immunization program is widespread and millions of children are immunized.

It is recommended that diagnosed cases of poliomyelitis be isolated for 1 to 2 weeks. General care should include occupational therapy, and understanding of the psychologic difficulties that beset the handicapped.

КОНТРОЛЬНА РОБОТА №32

Translate into Ukrainian

AMINES AND OTHER ORGANIC COMPOUNDS

The amines are derivatives of ammona, obtained by replacing one (or more) of the hydrogen atoms by organic radicals.

The lighter amines such as: methylamine, dimethyl-amine, and trimethylamine, are gases. Many amines have disagreeable odours and trimethylamine has a pronounced fishy odour.

Aniline is aminobenzene. It is a colourless oily liquid used in the manufacture of dyes and other chemicals. It is slightly soluble in water.

Acetanilide is a derivative of aniline. It is a white, crystalline, sublimable solid, phenylacetamide. It is produced by combining glacial acetic acid with aniline. It is used in neuralgia and rheumatism as an analgesic and antipyretic agent.

The halogen derivatives of hydrocarbons have some important uses. We can make four chlorine derivatives of methane by replacement of successive hydrogen atoms by the halogen:methyl chloride, methylene chloride, chloroform, carbon tetra-chloride.

Chloroform, is a clear, colourless volatile liquid, with strong ethereal smell and a sweetish, burning taste. It is used as a general anaesthetic by inhalation of its vapour. Chloroform and carbon tetrachloride are used as solvents.

Carbon tetrachloride, is a clear, colourless mobile liquid. It is an important dry-cleaning agent, it is non-inflammable.It is also used for fire extinguishers. Large amounts of its vapour if inhaled damage the liver. Carbon tetrachloride is also an anthelmintic.

The compound iodoform, is a yellow crystalline substance (triodomethane)with a strong penetrating odour (about 96 percent of iodine), .soluble in chloroform and ether. It is used as a disinfectant and antiseptic for the treatment of burns. It is a local antibacterial agent.

Many substances which occur in plant and animal tissues are compounds of nitrogen. One of these, urea, is the principal nitrogenous product of metabolism in the animal body. Urea has the formula. It is a white, crystallizable substance, the diamide of carbonic acid, from the urine, blood and lymph. It is the chief nitrogenous constituent of the urine, and is the final product of the decomposition of proteins in the body. It is the form under which the nitrogen of the body is given off. It is believed to be formed (in the liver) out of amino acids and other compounds of ammonia. Carbamide is urea in anhydrous, lyophilized, sterile powder form. It is used to induce diuresis;it is injected intravenously in dextrose or invert sugar solution.

Among the compounds containing nitrogen which are formed by plants are alkaloids. They occur only in certain families of Angiosperms and in the same species several alkaloids may be present. For example, opium which occurs in the dried juice of the unripe fruits of the Opium Poppy contains about 20 different alkaloids.

Alkaloids are mostly white solids, basic in reaction and slightly soluble in water. They are usually bitter in taste and physiologically active. They occur generally as salts of organic acids. Alkaloids are probably by-products of nitrogen metabolism and the plant does not appear to derive any benefit from the presence of alkaloids. They are, on the other hand, deadly poisonous to animals.

Most alkaloids have a marked effect on man. Owing to their value in medicine the following list gives the names and source of the most important ones.

Alkaloid	**Source**
Aconitine	Leaves and roots of Monkshood *[Aconitum)*
Atropine	Leaves and Cephaeline fruits of Deadly Nightshade (A*tropa belladonna)*
Cephaeline (Ipecacuanha)	Roots of Psychotria ipecacuanha

Cinchonine	Bark of Cinchora
Cocaine	Leaves of Erythroxylon coca
Coniine	Seeds of Hemlock *[Conium maculalum)*
Hyoscyamine	Seeds of Henbane *{Hyoscyamus niger)*
Morphine	Fruits of Opium Poppy *(Papaver somniferum)*
Nicotine ……	Leaves of Tobacco *(Nicotiana tabacum)*
Piperine	Seeds of Black Pepper *(Piper nigrum}*
Quinine	Bark of Cinchona Ledgeriana
Strychnine	Seeds of Strychnos nux-vomica

Closely allied to the above alkaloids are caffeine and theobromine. The source of caffeine — leaves and fruits of tea and coffee. The source of theobromine — beans of cocoa *(Theobroma cacao).*

There is also artificial alkaloid that is, made artificially by chemical processes.

EXERCISES

I. *Answer the following questions*:

1. What are amines?
2. What do you know about acetaniline?
3. What are the properties of chloroform?
4. Which is the non-inflammable agent in fire-extinguishers? Any other uses?
5. What is often used as a local antibacterial agent?
6. Where do we find urea?
7. What is carbamide?
8. Where do alkaloids occur?
9. What are the properties of alkaloids?
10. Are alkaloids of any use to man?

II. *Complete the following sentences*:

1. The amines are derivatives of -------
2. Aniline is slightly -------- in water.
3. Chloroform is used as a general ------- by ------- of its vapour.
4. Carbon tetrachloride is used as: -------, ------, ------.
5. Iodoform is a local ------ agent.
6. The principal nitrogenous product of metabolism in the animal body is -
7. Urea in anhydrous, lyophilized, sterile powder form is -----.
8. Alkaloids are probably by-products of----------.
9. The source of atropine are ----- and -----.
10. The source of caffeine are ----- and -----.

III. *Use* ***much*** *or* ***little*** *in the following sentences*:

1. The English do not drink ... coffee.
2. He doesn"t eat ... for breakfast.
3. There is ... hope.
4. They don't eat...fruit.
5. I know her very....
6. It is dangerous to have ... knowledge and ... is never too…...
7. They have ... money to buy that house.

8. Is it ... or ... in this case.
9. Does he get ... freedom?
10. Do we take ... interest in grammar or...?

V. *Suggestions for Composition Exercises (5-10 sentences each):*

I. Narcotics ...
2. Sleeping tablets.
3. My friend is an addict to ...
4. XX-th century and young people
5. What are young people trying to forget?

Translate into Ukrainian. Put 10 questions to the text.

BRONCHIAL ASTHMA

Bronchial asthma usually runs in the form of paroxysmal dyspnoea, chiefly expiratory, accompanied by wheezing, and due, in majority of cases, to sensitization to some extrinsic or intrinsic substance or substances.

An extrinsic protein allergen is demonstrable in about 40 per cent of the cases. Of these cases, an inhaled allergen is mainly responsible in adults, an ingested allergen in children. Air-borne allergens are mainly: 1) pollens, 2) danders and emanations from animals, 3) vegetable dust, 4) house dusts, and 5) fungi. The main ingested allergens responsible for asthma in children are eggs, wheat and milk. Multiple sensitiveness is common.

In those cases in which an extrinsic cause cannot be established, some intrinsic factor is usually responsible. This often cannot be determined. An acute infection, physical or nervous strain, or debility from any cause may inaugurate an attack of asthma in a previously subclinical case. The disease is common and about equally effects both sexes of all ages and races.

The exact mechanism by which bronchial asthma is produced is unknown. The attack is apparently due to muscular constriction of the bronchial "tree" as the result of vagus stimulation. The acute paroxysms occur at varying intervals and are of varying degrees of severity. Nocturnal attacks are common. The attack may last for minutes, or it may continue for many hours or days. Between attacks the patient is usually quite well, except that in many cases infections of the paranasal sinuses and the bronchi supervene and produce their own manifestations. Hypertrophic emphysema and even pulmonary heart diseases may eventually result. The symptoms and signs of an attack of bronchial asthma are:

1. Severe dyspnoea, with wheezing, affecting mainly expiration, but often inspiration, to some extent, also.
2. Slow respiration, with utilization of the accessory muscles of respiration and assumption of the upright position.
3. Cough, at first dry, but at the end of the attack productive of characteristic sputum.
4. Thorax full and fixed, with hyperresonance, diminished intensity of the breath sounds, and sibilant and sonorous rales throughout. The rales are often moist toward the end, or even during the attack, especially if there is a concomitant and complicating infection.
5. In severe cases, cyanosis, sweating, feeble pulse, and coldness of the extremities.

The blood pressure is essentially normal, but during inspiration the systolic pressure may fall. Some fever is occasionally present, especially in children. The blood shows eosinophilia of 5 to 50 per cent, and there may be polycythemia.

Course and Prognosis. Patients rarely die in an acute attack. The attacks may recur intermittently for many years, and the patients die as a result of some entirely unrelated disease. Chronic invalidism may result from complicating bronchitis, hypertrophic emphysema, or bronchiectasis. In rare

cases, heart failure supervenes. If the specific cause can be definitely determined, appropriate treatment may result in cure, but this happy outcome is not so common with asthma as it is with hay-fever.

Treatment. The most effective measure in the majority of cases is the subcutaneous injection of 0,5 to 1 cc. of the 1 : 1,000 solution of epinephrine (adrenalin) repeated every half hour if necessary. An effective combination by mouth is a tablet or capsule containing 0.12 gram of theophylline, 25 milligrams of ephedrine sulfate, and 15 milligrams of phenobarbital, taken every 4 to 8 hours. The sulfonamides and penicillin aerosol are worth trying in stubborn cases, particularly those in which the asthma is thought to be of infectious origin. Some relief is obtained in some cases by the inhalation of the smoke of asthma powders or cigarettes, the chief constituents of which are stramonium leaves and potassium nitrate. The use of potassium or sodium iodide, 0.3 to 1.3 gram, or syrup of hydriodic acid, 4 to 8 cc., 3 times daily, may reduce the frequency and the severity of attacks in some cases.

Between the Attacks. Any septic focus in the sinuses, teeth or genitor-urinary tract should be treated. General building up measures, and avoidance of fatigue and exposure to infection, are important.

КОНТРОЛЬНА РОБОТА №33

Translate into Ukrainian

AMINO ACIDS AND PROTEINS

The chief plant compounds containing nitrogen are the amino acids and the proteins. Proteins are made up of many amino acid groups linked together.

Amino acids are compounds having both the properties of amines and also of acids. Every amino acid has a carboxyl group, COOH, and one or more amino groups. The name amino acids suggests as much. Therefore, the compounds have both the properties.

The simplest amino acid is glycine or aminoacetic acid. It is a colourless, crystalline powder. It is derivable from many proteins and it is used as a dietary supplement.

All amino acids and proteins behave alike towards both acids and bases. This means: as a weak acid towards a strong base a as a weak base towards a strong acid. For example, sodium hydroxide (a strong base) and glycine forms a sodium salt of the amino acid; with hydrochloric acid, glycine reacts forming a salt, glycine hydrochloride. Besides that, the basic group of one amino acid molecule may react with the acid group of a second molecule forming a dipeptide. The condensation of amino acids leads to building up proteins and this is called peptide linkage and the process can be repeated over and over again.

Linkage (or bond) means the connection between different atoms or radicals of a chemical compound. A mark is used to indicate the number and attachment of the valencies of an atom in constitutional formulas. It is represented by a line or a dot between the atoms. Peptide, in turn, belongs to a class of compounds yielding two or more amino acids on hydrolysis. It is formed by the reaction of the groups of adjacent amino acids. They are known as di-, tri-, tetra-, etc., peptides depending upon the number of amino acids making up the molecule.

There are many naturally occurring amino acids. The substances are found either free as components of plant or animal tissues or as a product of the hydrolysis of protein. Several of them are essential in human nutrition. The essential amino acid is one that is essential for optimal growth in a young animal, or for nitrogen equilibrium in an adult. Those essential for nitrogen equilibrium in man are: isoleucine, leucine, lysine, methionine, phenylalanine, theonine, tryptophan, and valine. Histidine, in addition to the mentioned eight, is required by infants.

Proteins are among the most important substances in plants and animals. A protein is any one of a group of complex organic nitrogenous compounds widely distributed in plants and animals and which form the principal constituents of the cell protoplasm Therefore, proteins are substances which occur as separate molecules (with very large molecular weight), or as reticular constituents of cells, constituting their structural framework.

Proteins are separated into groups based chiefly on physical properties (solubility, coagulation, precipitation). These groups are: albumins, globulins, prolamines, nucleo-proteins, phosphoproteins (casein in milk), albuminoids, chromoproteins (colour of haemoglobin, in marine algae).

The human body contains many hundreds of different proteins.They have special structures to carry out specific tasks. The blood contains many different kinds of protein molecules, in solution in the plasma or within the cells of the blood. Hair, fingernails, skin, tendon and muscle fibres consist mainly of protein. Protein we find both in plant and animal food but to a higher degree in meat, eggs, milk, and cheese. Some vegetable foods (cereals, legumes, nuts) are fairly rich in proteins. Special enzymes convert proteins into simple amino acids so that the body can use them.

Synthetic proteins are highly complex polypeptides made in thelaboratory. They show most of the characteristics of nativeprotein.

Tests for Proteins

The following reactions indicating the presence of a protein are applied to a solution or suspension in water.

Millon's Test (for Proteins and Nitrogenous Compounds)

Reagent: A solution is made of 10 gm of mercury and 20 gm of nitric acid; this is diluted with an equal volume of water. After standing twenty-four hours it is decanted. The reagent gives a red colour (brick-red) with proteins and other substances (phenol tyrosine, and thymol) which contain the hydroxy-phenyl group.

Procedure: Add a few drops of the reagent and boil carefully.

Result: A red colour is produced.

Biuret Reaction (Test for Proteins)

To a solution of the protein in a test tube add about 2 c.c. of 40 per cent sodium hydroxide and one drop of a 1 per cent solution of copper sulphate. A pinkish-violet colour is produced.

Mulder's Test (Xanthoproteic Test)

Treat the suspected substance with nitric acid: proteins are turned yellow by it. If you alkalinize the substance, it becomes an orange yellow, due to the presence of the phenyl group.

EXERCISES

I. *Answer the following questions*:

1. What has every amino acid?
2. Which is the simplest amino acid?
3. What is peptide linkage?
4. Which amino acids are essential for human nutrition?
5. Which amino acid is required by infants?
6. What is a protein?
7. Which foods are rich in proteins?
8. What agents convert proteins into simple amino acids?
9. What can you say about synthetic proteins?
10. Do you know any test for proteins? Describe the procedure.

II. *Complete the following sentences*:

1. The simplest amino acid is ----- and it is used as a ------.
2. The condensation of amino acids leads to building up ----- and this is called---.
3. The essential amino acid is one that is essential for ----- ----- in a young animal, or for ----- ----- in an adult.
4. ---- are among the most important substances in plants and animals.
5. Protein we find both on ----- and ----- food.
6. All amino acids and proteins behave alike towards both ------ and -----.

III. *Fill in the missing words*:

1. Proteins are made ... ... many amino acids.
2 The condensation of amino acids leads ... building ... proteins.
3. He made that story....
4. She made ... her mind to do it ... again.
5. The process can be repeated ... and ... again.
6. They are known us di-, tri-, etc. peptides depending ... the number of amino acids making … the molecule.
7. Proteins are separated ... groups based chiefly ... physical properties.
8. Special enzymes convert proteins ... simple amino acids.
9. Some vegetable foods are fairly rich ... proteins.
10. They have special structures ... carry ... specific tasks.

V. *Suggestions for Composition Exercises (5-10 sentences each):*

1. Recent discoveries.
2. The Nobel Prize in Chemistry.
3. Synthetic proteins.
4. Foods rich in proteins…

5. Planning of a diet.

Translate into Ukrainian. Put 10 questions to the text.

RHEUMATIC HEART DISEASE

Introduction. Rheumatic heart disease is one the most serious of all the diseases of childhood, partly because of its frequency, but even more so because of its tendency to inflict years of disability and suffering on its victims. It is by far the most common cause of acquired heart disease in early life.

Etiology. Distribution. Rheumatic carditis is widespread throughout the temperate zones, but is rarely encountered in the tropics.

Age. The age incidence is one of the most striking features of rheumatic carditis as is of the other forms of juvenile rheumatism. The disease is so rare under three years of age that one would properly hesitate before making the diagnosis, and it remains uncommon until the fifth year. The incidence then rises steeply to reach a maximum between the eighth and tenth year, the number of first attacks falling off rapidly as puberty is approached, although recrudescences are often met with during these years.

Sex. Girls are slightly more often affected than boys. The association between rheumatic heart disease, rheumatic polyarthritis, and chorea needs to be mentioned. As a rule, these other forms of juvenile rheumatism precede or concide with the onset of the heart infection, and even if the heart escapes during the first attack of arthritis or chorea, both these conditions are liable to be repeated and the heart may be involved in a later attack.

It happens not infrequently that rheumatic heart disease is discovered quite accidentally during the course of routine examination, in fact this is so in about 14 per cent of cases of children with carditis. It is now generally accepted that rheumatic heart disease is an allergic and infective process, and the view that the infection is streptococcal has steadily gained ground. The possibility that rheumatic carditis may ultimately be bound to depend on infection by a filter-passing virus must not be overlooked, although none of the claims in this direction has so far been substantiated.

Symptoms. One of the most distressing features of rheumatic carditis is the insidiousness of its onset. It is not all uncommon for it to be discovered that a child brought in for such vague symptoms as shortness of breath, failure to gain weight, or anaemia, reveals on examination signs of cardiac disease obviously of some considerable duration. On the other hand, if a child is kept under observation after a sore throat, or on account of rheumatic fever, the clinical course of the carditis may be traced from its inception. In such cases, one of the first symptoms is a rapidly increasing pallor, the complexion taking on a waxy or earthy tint. The temperature at the onset is generally raised to 100° or 101°F. (37.7° or 38.3°C), and as a rule remains up for two or three weeks before gradually setting to normal or subnormal. The pulse rate rises with the temperature, and may run as high as 140 or so per minute, remaining raised for several weeks or months, or for as long as active inflammation is present, and settling very slowly some other time after the temperature has returned to normal. Of other symptoms (early), vomiting and loss of appetite are common. Nose bleeding is not infrequent. Pain over the heart is often complained of, particularly if there is pericarditis. The disease is likely to make the child restless and frightened, especially at night-time.

Even if anaemia does not appear to begin with, it becomes obvious after a week or two, and persists long into convalescence. At the beginning, the weight often falls rapidly, and the child may soon become wretchedly thin; it is, in fact, the loss of weight which is sometimes the reason for medical advice being sought. Great value is attached to regular weighings, since weight offers one of the best guides to the child's progress; this holds good when the child is under supervision after the active phase is over, for, so long as the weight is rising, albeit slowly, it affords a safe indication that no fresh inflammation is occurring.

The majority of children survives their first attack of rheumatic carditis, but is left with a varying degree of scarring of the heart muscle and valves. Provided no further attacks ensue, they may grow up with nothing worse than a mitral regurgitant bruit and some slight cardiac hypertrophy,

not sufficient to interfere to any appreciable extent with their activities or their earning of their livelihood. In others, the initial injury is severe, and as recovery proceeds the mitral valve becomes more and more thickened and contracted, until the clinical picture of mitral stenosis slowly develops, exerting a progressively incapacitating influence and eventually ending in cardiac failure.

Once a heart has been affected there is throughout childhood a risk of recrudescences of acute inflammation, and each such attack means a further permanent injury to the heart, if indeed it does not prove fatal. In yet other cases, the child never seems to make a proper recovery from the initial attack but the disease slowly smoulders on with an occasional exacerbation every few weeks or months. Such children are in a bad way, and, after perhaps months or a year or two of a steadily downhill course, die during an acute relapse.

In childhood, death from rheumatic carditis almost always occurs during or soon after a period of fresh infection. A fatal issue from slowly progressive cardiac failure, the result of sclerosis of the valves, is generally delayed until early adult life, but if the initial illness occurs at a sufficiently early age, this sequence of events may be met with towards puberty.

Treatment. Rest must be absolute. Trained nurses must be employed, as expert nursing is of the utmost importance. The diet in an illness which runs so long a course needs to be both nourishing and easily digestible. Meals should be small and frequent. To begin with milk, milk puddings, broths, jellies, eggs, fish, stewed fruit, and thin bread and butter will form the main part of the diet. Pain over the heart is best dealt with by warm poultices such as antiphlogistine or linseed.

Another troublesome symptom is cough, which should be checked because it adds needlessly to the work of the heart, it is best dealt with by a linctus containing 10 or 15 minims of tinct. camph. co. The basic drug in the treatment of rheumatic heart disease is natrium salicylicum or aspirin in large doses. Recently the administration of salicylates is combined, with great success, with the administration of ACTH or cortisone. The use of these drugs constitutes a turning point in the thus far accepted treatment of rheumatic heart disease.

The second phase of treatment arises when there is progressive cardiac failure, as indicated by cyanosis, pulmonary congestion, enlargement of the liver, and widespread oedema. Such failure may arise while the heart is actively inflamed, or it may be due to a failure of compensation from increasing mitral stenosis. The withdrawal of a small amount of blood is one of the best and quickest ways of giving relief. Digitalis and strophanthin are also of great value in this stage.

The convalescent stage is a long and difficult one and should be managed at a convalescent home.

КОНТРОЛЬНА РОБОТА №34

Translate into Ukrainian

IONIZATION

In a normal solution *[e.g.* sugar and water), the dissolving substance (or solute) separates into molecules that become evenly dispersed throughout the solvent.

Acids, bases and salts separate into .smaller particles than molecules when they are dissolved in water. Therefore the molecules of acids, bases and salts in aqueous solution subdivide or dissociate into ions consisting of electrically charged atoms or groups of atoms. The dissociation into ions takes place only at the time the solute is dissolved.

An ion is, therefore, an atom or group of atoms bearing an electric charge, or a number of such charges. There are two types of ions: 1) the positive ions (cations) which move toward the negative electrode (cathode), 2) the negative ions (anions) which move toward the positive electrode (anode).

Solutions of acids, bases and salts conduct an electric current and so they are called electrolytes. Solutions of sugars, alcohols and other substances do not conduct a current and therefore non-electrolytes. Since the solution of any electrolyte is electrically neutral, the total charges carried by the positive ions are equal to those carried by the negative ions.

The word **ion** is derived from a Greek word meaning "wanderer" Thus it means that the charged atoms migrate or drift apart.

A solution of hydrogen chloride in water consists of two parts:

I) an undissociated part, made up of hydrogen chloride molecules, 2) a dissociated part or ionized, made up of equal numbers of hydrogen atoms carrying a positive charge and chloride atoms carrying a negative charge.

The undissociated portion is considered as inactive. It plays no part in the conduction of the current, it exerts a normal effect on the physical properties of the solution (vapour pressure, boiling point and freezing-point changes), it does not convey to the solution any of the properties of an acid.

The other part of the hydrogen chloride which breaks up into hydrogen ions and chlorine ions is active.

There is an equilibrium between the undissociated and disssociated part of an electrolyte in solution.

In ionic equations the charges upon ions are shown for they are essential parts of the ionic substances.

Ions may be mono, di, tri and so on positive or negative and they are usually marked in the following way in case of cations.

The plus and minus signs denote the type of charge carried, and the number of signs used denotes the valence of the ion. Hence, in the above equation, the hydrogen and chlorine ions each have a valence of 1.

The addition of more water disturbs the equilibrium between the ionized and the non-ionized and the non-ionized parts of the solute, increasing the percentage of the ionized material. Ionization becomes practically complete at very high dilutions. Removal of water, by evaporation, causes some of the ions to unite. Ionization is, therefore, a reversible reaction (chemical action).

EXERCISES

I. *Read the following sentences and then make questions*:

1. The dissociation into ions takes place only at the time the solute is dissolved.
2. An ion is an atom or group of atoms bearing an electric charge, or a number of such charges.
3. Solutions of acids, bases and salts conduct an electric current.
4. The word ion is derived from a Greek word.
5. There is an equilibrium between the undissociated and dissociated parts of an

electrolyte in solution.
6. In ionic equations the charges upon ions are shown for they are essential parts of the ionic substances.
7. The plus and minus signs denote the type of charge carried.
8. The number of signs used denote the valence of the ion.
9. Ionization becomes practically complete at very high dilutions.
10. Removal of water, by evaporation, causes some of the ions to unite.
11. Ionization is a reversible chemical action.

II. *Insert the prepositions in the following sentences*:

1. ... a normal solution the dissolving substance separates ... molecules.
2. The dissociation ... ions takes place only... the time the solute is dissolved
3. Since the solution any electrolyte is electrically neutral, the total charges carried ... the positive ions are equal , those carried ... the negative ions.
4. The word ion is derived ... a Greek word.
5. It plays no part…. the conduction... the current.
6. There is equilibrium… the undissociated and dissociated parts.
7. Ionization becomes practically complete... very high dilutions.
8. Removal ...water, ... evaporation, causes some ... the ions ... unite.
9. The molecules...acids, bases and salts ... aqueous solution subdivide ... ions consisting ... electrically charged atoms.
10 ...a normal solution, the solute separates… molecules that become evenly dispersed... the solvent.

III. *Insert **since** or **for** in the following sentences*:

1. They have been here... two years
2. He has been ill... last Monday.
3. She was here… a few minutes.
4. He will stay in the hospital ... six weeks.
5. I have not seen him ... last year.
6. In have lived here ... ten years.
7. I have not seen her ... a long time.
8. He has been there... one o'clock.
9. ... it is difficult, it must be explained again.
10. They have collected the flowers…April.

IV. *Complete the following sentences*

1. The d----n into ions takes place only at the time the s--e is dissolved.
2. The positive ions are c-----s.
3. The negative ions are a----s.
4. The negative electrode is c-----e.
6. Solutions of acids, salts and. bases conduct an electric current—they are---s.
7. The word ion comes from a Greek word meaning "w----r".
8. Substances which do not conduct an electric current are called n-n e-----s.
9. The number of the plus and minus signs used in ionic equations denotes the v---e of the ion.
10. Ionization is a r-----e r----n.

VI. *Suggestions for Composition Exercises (5-10 sentences each):*
1. Today's research work is devoted to the study of atomic nuclei.

2. Will Tomorrow bring other subatomic particles?
3. Electrolytes.
4. Equilibrium
5. The use of electric current.

Translate into Ukrainian. Put 10 questions to the text.

CHOLELITHIASIS

Infection, bile stasis, and disturbance of cholesterol metabolism are probable factors in the pathogenesis. Occasionally, gallstones are present without much evidence of infection of the gallbladder. Cholelithiasis is chronic, the stones may be single or multiple, and they usually contain cholesterol, calcium, epithelial debris, bacterial debris, bile salts, and bile pigments. Multiple stones usually contain bile salts and are dark, smooth and faceted. The gallbladder may be filled with such stones of more or less uniform size. Large, solitary stones are yellow, crumbly, and consist mainly of cholesterol. Middle-aged, obese persons are particularly susceptible.

Symptoms and Signs. The following syndromes may occur:

1. Gallstones may exist for years without producing any definite symptoms.
2. Dyspepsia, such as occurs with chronic cholecystitis (inflammation of the gallbladder), may be the only manifestation. Such cases are frequently associated with chronic cholecystitis. When persistent and not readily controlled, chronic dyspepsia calls for a gastro-intestinal X-ray study and a cholecystographic examination. Physical signs are lacking.
3. Gallstone or biliary colic may occur at variable intervals, without, but more often with, a history of chronic dyspepsia. A small stone enters the cystic duct, often at night and usually abruptly, causing severe pain, nausea and often vomiting. The pain is in the upper abdomen, and more often in the epigastrium than in the right hypochondrium. It frequently radiates through the body to the back and the region of the right scapula. It is more or less constant, with exacerbations of extreme intensity. It causes the patient to change his position frequently, but it persists in spite of such changes. The pain may last for hours and then gradually subside, the stone either reentering the gallbladder or passing through the common bile duct. The pain is relieved, for a time at least, by morphine or by atropin with papaverine injection. There may be slight localized tenderness and rigidity over the gallbladder. There are tachycardia, prostration, sweating and sometimes slight fever. Some tenderness prostration and nausea may persist for a day or two after the biliary colic.
4. A stone may lodge in the common bile duct. Then there is jaundice associated with a gallstone colic. Pain is rarely absent. The jaundice may last for days and then subside when the stone passes on. The jaundice usually varies in intensity, and is sometimes accompanied by fever of an intermittent character, pain chills, and sweats. The colour of the skin, stools and urine varies from time to time. Occasionally, the stone completely closes the duct or ampulla of Vater and produces chronic jaundice with biliary cirrhosis.

Diagnosis. It must be remembered that the presence of gallstones is not absolute proof that they have caused the patient's symptoms. The not infrequent association of gallbladder disease and coronary artery sclerosis may result in confusion. The basis for this association is unknown, but a disturbance of cholesterol metabolism is common to both, and there is a related innervation through the vagus. If there is doubt as to diagnosis as between these two diseases, it is wiser and safer to treat the condition as cardiac. If there is good evidence of gallbladder disease, it may be justifiable to attack the gallbladder in the hope that marked relief may be obtained.

The greatest difficulty in diagnosis results when jaundice is caused by obstruction of the common bile duct by a "silent stone". Then, various laboratory tests are helpful and laparotomy is advisable.

Treatment. The treatment of cholelithiasis consists in the surgical removal of the gallbladder and stones. Occasionally, when the symptoms are mild or complications exist, it may be wiser to depend upon medical treatment as for cholecystitis. It is well to remember that in the majority of cases cholecystitis is accompanied by cholelithiasis (gallstones), to which it predisposes and, on the other hand, cholelithiasis predisposes to cholecystitis.

A bland, moderately low-fat, weight-reducing diet is indicated. Eggs, pork products, fried foods, gravies, fatty fish (salmon, mackerel and herring), cheese, spicy foods, onions, sauerkraut, cabbage, turnips, radishes, cucumbers and alcoholic beverages should be forbidden. Butter, milk, cream and olive oil may be used in moderation. The bowels should be regulated when there is constipation.

Sometimes, in the presence of severe infection, it is not possible to do more than drain the gallbladder, delaying its removal until a later operation. When a stone obstructs the common bile duct, it should be removed surgically. If jaundice exists, the common bile duct should always be explored and a cholangiogram made after injection of 35 per cent diodrast to determine whether stones have been overlooked. Drainage through a T-tube should be instituted and a cholangiogram made again before the tube is removed. After the gallbladder has been removed, symptoms of digestive disturbance may recur. For this reason it is wise to continue the medical regimen.

Adequate preparation of the patient for operation is important. This consists in reduction of obesity if time permits by means of a low-caloric but high-carbohydrate, high-protein, low-fat diet, estimation of liver function and prothrombin time, administration of 5 per cent glucose solution intravenously, and the use of vitamin K and bile salts if jaundice is present. One to 3 grams of animal bile salts is an adequate daily dose to facilitate absorption of vitamin K, but the use of bile salts is necessary only if the vitamin is given orally.

The treatment of gallstone colic consists mainly in the use of morphine sulphate always combined with atropin. The intravenous injection of calcium gluconate (10 cc.) is often efficacious.

The use of nitroglycerin as for angina pectoris may control mild attacks.

КОНТРОЛЬНА РОБОТА №35

Translate into Ukrainian

ACIDS

Acids, salts and bases are three great classes of chemical compounds.

Acids are compounds containing hydrogen atoms. The hydrogen determines the characteristic properties of the compounds. This hydrogen becomes a free ion in aqueous solution and is replaceable by a metal, that is, a metal may take the place of hydrogen. in an acid and the formation of salt results.

The part of an acid remaining after its replaceable hydrogen has been removed is called an "acid radical (radicle)". Acid radicals may be simple like Cl and S, or compound, like $S0_4$ and CO_3. An acid radical remains unchanged during a series of reactions and therefore is regarded as playing the part of a single atom.

Owing to the effect of the hydrogen ion, acids change blue litmus to red,-and their weak solutions have a sour taste. •Common acids are:

1. hydracids— containing hydrogen and a non-metal
2. Oxyacids — containing oxygen, in addition to hydrogen and a non-metal.

Typical hydracids are: hydrochloric acid, hydrobromic acid, hydriodic acid, hydrosulphuric acid

The oxyacids include: sulphuric acid, nitric acid, phosphoric hypochlorous acid, acetic acid, carbonic acid.

The **ic** ending of the acid names indicates higher valence and ability to hold more oxygen in combination than the ous ending. Thus sulphuric acid, has more oxygen than sulphurous acid.

One of the most important acids is hydrochloric acid. Hydrogen chloride or hydrochloric acid (the last name is commonly used for the solution) is made in the laboratory by heating common salt with concentrated sulphuric acid.

The products are sodium hydrogen sulphate and hydrogen chloride. Hydrochloric acid then is an aqueous solution of hydrogen chloride. The dilute acid acts readily on zinc, iron, magnesium and aluminium, releasing hydrogen gas.

The composition of hydrogen chloride may be demonstrated both by analysis and by synthesis.

Chemical properties of hydrochloric acid:

1. the solution is sour in taste;
2. it changes the colour of litmus, a vegetable colouring matter, from blue to red;
3. it is a conductor of electricity, and is decomposed by the current, hydrogen being liberated at the negative wire;
4. When metals preceding hydrogen in the order of activity are introduced into hydrochloric acid, hydrogen is displaced and liberated.

These four properties are common to all substances called acids. Hydrochloric acid (or muriatic acid) is used commercially to make ammonium chloride for the manufacture of dry cells, chemical dyes, soap, textiles and many other products. It is also employed for cleaning metals. Although present in very small proportions (about 1 part in 500) in the gastric juice of the stomach, it is a most important component of this fluid. It is sometimes given as a medicine, when the natural supply is too small.

EXERCISES.

I. *Read the following sentences and make questions*:

1. Acids, salts and bases are three great classes of chemical compounds.
2. The hydrogen determines the characteristic properties of the compounds.
3. The *ic* ending of the acid names indicates higher valence.

4. One of the most important acids is hydrochloric acid.
5. The hydrochloric acid is sometimes given as a medicine, when the natural supply is too small

II.*Give the opposite meaning of-the following words*:

sour	positive	concentrated
clean	high	liquid
single	present.	active
small	more	following

III. *Complete the following sentences*:

1. Acids are compounds containing h-—---n atoms.
2. A metal may take the place of h—n in. an acid and the formation of s--t results.
3. When the hydrogen is removed, the part of an acid remaining is called an a--d r----l.
4. Acids change b--e litmus to r-d.
5. Hydracids are acids containing h------n and a n-n-m---l.
6. Oxyacids are acids containing o----n, in addition to h------n and a non-metal.
7. An acid radical remains unchanged during a series of reactions and therefore is considered as a s----e a--m.
8. The *ic* ending of the acid names indicates higher v-----e and ability to hold more o----n than the *ous* ending.
9. Sulphurous acid has less oxygen than s---C A--d.
10. The dilute hydrochloric acid acts readily on zinc, iron, magnesium and aluminium, releasing h------n g-s.

V. *Suggestions for Composition Exercises (5-10 sentences each):*
1. Commercial use of hydrochloric acid.
2. First-aid in poisoning.
3. Safety first...
4. Care in handling laboratory glassware.
5. Labels indicating the contents...

Translate into Ukrainian. Put 10 questions to the text.

PYELITIS

Pyelitis is an bacteria infection of the pelvis of the kidney usually due to *B. coli, B. proteus,* or streptococci. It is a very common condition, especially during the latter part of pregnancy, and in old people and children. The infecting organisms reach the kidney by the blood stream or as an ascending infection. The infection may be confined to the kidney pelvis, usually it also involves the parenchyma of the kidney. Thus the term "pyelitis" is often incomplete.

The onset of acute pyelitis may be abrupt. There are clinical evidences of infection, such as fever of a septic type, chills, sweats and leukocytosis. The patient may complain of frequency, and of burning on urination, and the urine will be found to contain and white blood cells and a few red blood cells. Some albumin is also usually present. Occasionally there are more red blood cells than white in the urine. The only positive finding revealed by physical examination may be tenderness in the cost vertebral angle or angles. Renal function is not disturbed.

There may be complete recovery from an attack of acute pyelitis but in some cases chronic infection of the kidney pelvis develops. Chronic pyelitis is a relatively benign disease. There may be a little pus in the urine from time to time, but the general health of the patient remains good. Occasionally, acute pyelitis may produce a very distressing condition, and may require several weeks of intensive treatment before there are signs of improvement.

Acute or chronic pyelitis and pyelonephritis are treated mainly by administering large daily amounts of liquid, by general supportive measures, by means of urinary antiseptics and antibiotics,

and by changing the pH of the urine, but in every case obstruction should at the same time be removed or adequate drainage established.

From a scientific standpoint, urinary tract infections should be treated on the basis of the organism or organisms responsible. Thus, while penicillin is useless, sulfathiazole, sulfadiazine or sulfacetimide given orally, in doses of 1 gram every 4 hours for five days, are very effective against *Escherichia coli.* When this organism is not eradicated by the sulfonamides, streptomycin parenterally, or chloromycetin, terramycin resp. aureomycin orally is usually effective.

The *Aerobader* group of colon bacilli are frequently resistant to the use of sulfonamides but sensitive to the use of streptomycin. Staphylococci and hemolytic and nonhemolytic streptococcus infections are usually eliminated by sulfonamide therapy, although *Staphylococcus albus* may be resistant. *Proteus ammoniae* infection frequently responds to the use of penicillin or streptomycin. *Streptococcus fecalis* is most resistant, but may be eradicated with a high urinary concentration of penicillin or streptomycin or the use of mandelic acid. *Pseudomonas aeruginosa* is also very resistant.

When the causative organisms are resistant to treatment, it is often necessary to have a urologist wash out the kidney pelves with some such antiseptic as mild solution of silver nitrate or mercurochrome. The most important factors in the treatment of more severe chronic renal infections (such as pyelonephritis) are the elimination of obstruction to the outflow of urine and the eradication of foci of infection. When one kidney is badly damaged as the result of infection (tuberculous or otherwise), and renal function tests show the other kidney to be functioning well, surgical removal of the bad kidney is indicated. Perinephritic abscess requires incision and drainage.

КОНТРОЛЬНА РОБОТА №36

Translate into Ukrainian

VALENCE IN TERMS OF ELECTRON THEORY

Why is it that some elements have a greater combining power than others? "What "makes the characteristic valence of:each element, what: is it? The modern theory of atomic structure explains these facts.

Atoms are minute, unit particles of which elements are composed. They are the smallest particles which can combine chemically to form a compound.

Atomic weights are numbers representing the relative weights of the atoms of different elements. The atomic weight of oxygen has been arbitrarily fixed at 16 as a standard.

Small as atoms are, they are now thought of as more or less complex aggregations of positive and negative electrical units. The units of matter include:

1. The electron, which has negligible mass and carries a unit negative electrical charge. The mass is only 1/1845th of that of a proton.
2. The proton, which has much greater mass and carries a unit positive electrical charge.
3. The neutron, a particle with the same mass as a proton but no electrical charge. It is thought to consist of an electron closely bound to a proton so that its charge is neutralized.

Other subatomic particles like positrons, mesotrons and others have been discovered in recent years. They fall into three groups as to weight—light, intermediate, and heavy but all the charged particles in the atom carry the same unit amount of electrical charge.

All atoms are considered to be made up of a positively charged nucleus which consists of neutrons and protons with the positive electrical units (protons) in excess and of a number of .free electrons (negative electrical units) revolving about this nucleus. It is the number and arrangement of free (or "planetary") electrons more particularly those in the outermost ring or orbit farthest from the nucleus which determines the combining power or valence of an element. Electrons are arranged in rings about the nucleus (in concentric "shells"), following; a .definite pattern (2 electrons complete the innermost ring, 8 the second, and there may be up to *8 or 18* in the third ring).

When the arrangement of these free electrons in the atoms of a certain element is very stable, that element is chemically inactive and will not combine easily with other elements. Elements which have an unstable arrangement of electrons in the outermost
orbit of their atoms readily lose, gain, or share electrons with other elements and so enter into numerous chemical combinations. The nucleus and inner rings of planetary electrons remain unchanged when the atom enters into chemical changes.

The number of free electrons and the number of positive charges carried by the nucleus (called the atomic number), which must be equal to make the atom electrically neutral, is known for the different elements, ranging from 1 to 103 as the elements increase in atomic weight and complexity from hydrogen (atomic weight 1) to lawrence (atomic weight 257).

An atom is most stable when the outher ring (or orbit) is complete, i. e., contains the maximum number of planetary electrons. The number of electrons which can be gained or lost accounts for ad determines the valence of the element. The number of + signs written after the symbol of the metals indicates the number of electrons which each atom loses on combining. Minus signs after the non-metals show how many electrons-or unit negative charges each atom takes on when it enters into chemical combination. These form a measure of the-positive or negative valences of the elements.

EXERCISES

I. *Answer the following questions*:

1. What are elements composed of?
2. What forms a compound?

3. What are atomic weights?
4. What does the modern theory of atomic structure explain?
5. What do the units of matter include?
6. Are there any subatomic particles known?
7. What are atoms made up of?
8. What determines the valence of an element?
9. When do we say that an element is chemically inactive?
10. Which elements enter into numerous chemical combinations?
11. What does the number of signs written after the symbols of the metals indicate?
12. What class of elements has negative valence?

II. *Fill in the missing words*:

1. The atomic weight of oxygen has been arbitrarily fixed ... 16 as a…
2. The electron carries a unit... electrical charge..
3. The proton carries a unit... electrical charge.
4. The neutron carries ... electrical charge.
5. Electrons are arranged ... rings ... the ....
6. The outermost ring is called ....
7. Free electrons are also called ....
8. The atomic number is known ... the different....
9. The atomic numbers range ... I ... 103 ... hydrogen ... lawrence.
10. The smallest particles which can combine chemically to form a compound are ...II**.** *Read the following fractions*:

2/5, 10/17, 8/150, 1/90, 1/1845.

V. *Suggestions for Composition Exercises (5-10 sentences each):*

1. New concepts in chemistry.
2. The periodic table.
3. The noble gases and their practical use.
4. A day in modern Chemical Works.
5. The chemical industry in Poland.

Translate into Ukrainian. Put 10 questions to the text.

DIABETES MELLITUS

Diabetes mellitus is a primary, incurable inability of the tissues properly to utilize glucose because of an insufficient production of insulin, the internal secretion of the islands of Langerhans of the pancreas. The cause of this disease is unknown. Adults are more frequently affected than children, the highest incidence being between 50 and 70 years of age. Males and females are about equally affected.

Symptoms and Signs. The onset of the disease may be either acute or insidious. In children, it is usually sudden and often severe from the start. In adults, the onset may be sudden but is frequently insidious, and the disease, though often mild, may be of any degree of severity. In untreated cases of children and adults, the disease may increase rapidly in severity, whereas in older adults the disease often progresses very slowly.

Symptoms most often complained of in cases of mild or moderately severe diabetes are: generalized weakness, loss of weight despite an exceedingly good appetite and increased thirst and urination. There may be stationary weight or obesity. In some instances the diagnosis of diabetes is first suspected by the ophthalmologist whom the patient visits because of failing vision; the discovery of the disease is thus usually accidental. Various skin eruptions such as furunculosis, acne or

carbuncles also commonly appear. Itching of the skin, particularly about the genitalia is common. Severe diabetes is characterized by a definite increase in the symptoms noted above. Polyurinal and polydipsia may be so in tense as measurably to interfere with sleep. The appetite, although it may continue to be good, usually falls off, and marked loss of weight and strength follows. There are no characteristic physical findings in diabetes mellitus although the finding of certain retinal changes is suggestive and the diagnosis should be suspected in all patients who show evidence of rapid loss of weight, itching of the skin, decrease in the tendon reflexes and skin infections. Since urinalysis has become a routine procedure, very few cases of diabetes are overlooked. It is important, however, that a urine specimen be taken one or two hours after a meal containing a high amount of carbohydrates, since it is only at that time that mild cases may show glycosuria. The finding of glycosuria is not in itself diagnostic of diabetes — there are various other causes of glycosuria. Glucose may appear in the urine in other conditions such as hyperthyroidism, hyperpituitarism, hyperadrenia, cerebral tumours, deficiency in sugar storage (a lag sugar tolerance curve), and with a low renal threshold (renal glycosuria). The finding of an elevated fasting blood sugar level (about 130 mg. per 100 cc.) or the discovery of a postprandial blood sugar value of 170 mg. per 100 cc. is presumptive evidence of diabetes. In the presence of the characteristic symptoms of the disease, these findings are practically diagnostic.

Treatment. Diabetic patients do not tolerate excessive amounts of food. One must, however, remember that these patients most need carbohydrates, therefore protein and fat in the diet must be limited in order to facilitate the most abundant assimilation of carbohydrates. This makes it possible to make up the diet with a relatively high amount of carbohydrates. If the diet is low in calories but with a sufficient carbohydrate content, then it acts sparingly, supplies the necessary energy material and the necessary material for forming glycogen, and increases the assimilation of carbohydrates. The limitation of calories may be applied only in well-nourished and not weakened patients. It cannot be introduced in the case of children, wasted patients and patients who are afflicted in addition to diabetes, by some other diseases and require good nourishing food. In the case of patients who cannot be nourished by limited quantities of food, insulin must be used so that the calories given in abundance can be completely utilized. The patient should be told that the complete disappearance of sugar in the urine is not necessary and that excreting several grams of sugar during a 24-hour period has no meaning if the patient feels well and has a positive carbohydrate balance. Since diabetes is a chronic disease sometimes lasting the whole life the diabetic management should not tire and exhaust the patient. A diabetic patient should work, take an active part in sports, in fact take part in all activities of normal individuals. There are several important complications against which the physician and the patient must constantly guard. These are: diabetic acidosis and coma, atherosclerosis, purulent infections (such as furunculosis, cellulitis, abscesses, osteomyelitis), peripheral neuritis, ocular complications. In addition, the presence of diabetes is in certain circumstances a serious complication. These are: pregnancy, systemic infections, hyperthyroidism and surgical operations. It is important that patients with diabetes should know as much as possible about their disease. They should know that "once a diabetic, always a diabetic".

Diabetic patients should be advised never to hesitate to call a physician even for minor complaints, as these may be the first symptoms of serious complications. The nature and action of insulin should be explained to them so that they will never fail to take the injection as prescribed.

КОНТРОЛЬНА РОБОТА №37

Translate into Ukrainian

HYDROGEN—ION CONCENTRATION (pH)

THE pH SCALE

The pH symbol is commonly used in expressing hydrogen-ion concentration, the measure of alkalinity and acidity. The pH value is the negative logarithm of the hydrogen ion concentration of the solution expressed in gram ions for each liter.

The hydrogen ion concentration decreases,, and a change of 1 pH unit means a tenfold change in the hydrogen ion concentration. Thus;.pH 1.0 is 10 times as acid as pH 2.00 or 100 times as acid as pH 3.0. Neutrality is pH 7.0 at 20°C. So the neutral point is pH 7.0;. above 7 alkalinity increases; below 7 acidity increases.

Pure water has a very small but measurable electrical conductivity, which is about one ten-millionth of 1 N solution of an acid or base. This suggests that the ionization of water

$$H_20 \rightarrow H{+}{+}OH{-}$$

gives hydrogen ions (hydronium ions) and hydroxyl ions in concentration about 10-N. Refined measurements have provided the value 1.00 x10 for (H+) and (OH-) in pure water at 25 °C. Instead of saying that the concentration of hydrogen ion in pure water is 1 x 10, it is customary to say that the pH of pure water is 7.

Indicators

Indicators are compounds, usually organic, which indicate the pH of a liquid by means of the colour which they give. The colours, or changes in colour, are ascribed to specific arrangements or rearrangements in the molecule of the indicator.

Indicators may be roughly classed into two types: 1) Titration or endpoint indicators which give a rather sudden shift of colour at some particular pH. 2) Indicators which undergo a rather gradual and uniform alteration in colour over a considerable range of pH, within which range they are useful in determining the pH of solutions.

The more frequently used indicators are the following: thymol blue, methyl red, methyl orange, phenophthalein and others. Litmus is-an. indicator of variable composition and is not reliable for precise measurements. Its pH range is roughly: red 4.5-8.3 blue. Litmus paper is convenient for noting whether a solution is distinctly acid or alkaline.

Hydrogen is typically produced by heating natural gas with steam to form a mixture of hydrogen and carbon monoxide called syngas, which is then separated to produce hydrogen, according to the Royal Society.

Hydrogen is used to make ammonia for fertilizer, in a process called the Haber process, in which it is reacted with nitrogen. The element is also added to fats and oils, such as peanut oil, through a process called hydrogenation, according to Jefferson Lab. Other examples of hydrogen use include rocket fuel, welding, producing hydrochloric acid, reducing metallic ores and filling balloons, according to Los Alamos. Researchers have been working on developing the hydrogen fuel cell technology that allows significant amounts of electrical power to be obtained using hydrogen gas as a pollution-free source of energy that can be used as fuel for cars and other vehicles.

EXERCISES

I. *Answer the following questions*:

1. What does the pH symbol express?
2. What is the pH of pure water?
3. How are the values read on the pH scale?
4 What are indicators?

5. How are indicators classed?
6. Is litmus a reliable indicator?
7. What can we note with litmus paper?

II. Complete the sentences using the correct form of the present tense.
1. It often _____ in Ireland. That's why they call it the "Green Island". But it _____ there at the moment. (RAIN, NOT RAIN) 2. Such behaviour normally _____ me furious (MAKE). 3. I _____ a word he says. (NOT BELIEVE) 4. I _____ a hat today because it's such a special event. (WEAR) 5. Susan _____ an email to her parents nearly every Saturday evening. (WRITE) 6. Stop right now! You _____ the flowers every time the ball _____ in the flower bed. (BREAK, LAND) 7. Where is Jimmy? – I don't know. I _____ he _____ tennis with his younger brother, Mark. (THINK, PLAY) 8. My mum _____ a party for her best friends once a year. (ORGANISE) 9. She _____ in London, but she _____ with friends up in Scotland. (LIVE, CURRENTLY STAY) 10.Our headmaster rarely _____ a class. He _____ a lot of administrative work to do. (TEACH, HAVE)

III. *Give opposites for the following*:
gradual roughly
within endpoint
useful pure
stable normal

IV. *Write sentences to illustrate the use of*: ***instead of as*** a preposition and ***instead as*** an adverb.

V. *Read the following*:
10-3 mm, 10-8 cm, 10-6 mm, 1.66x 10^{-24}gm (1 micron, 1 angstrom, 1 millimicron, mass of a hydrogen atom).

VI. *Fill in the missing words*:
1. Indicators are compounds which indicate the pH ... a liquid … means ... the colour which they give.
2. The changes ... colour are ascribed ... specific arrangements or rearrangements ... the molecule ... the indicator.
3. Litmus is not reliable ... precise measurements.
4. It is convenient ... noting acidity or alkalinity.
5. Indicators may be roughly classed ... two types.

VIII.*Suggestions for Composition Exercises (5-10 sentences each):*
1.Famous Chemists.
2.Safety regulations in the chemical laboratory.
3.The use of chemical agents in the protection of plants.
4.Chemistry and man… .
5 My hobby…

Translate into Ukrainian. Put 10 questions to the text.

PERNICIOUS ANAEMIA

Pernicious anaemia is a chronic, progressive, macrocytic, hyper chromic anaemia. It is due to a deficiency of the antianaemic factor of liver dependent upon failure of the stomach to secrete an intrinsic factor. The disease is characterized by a tendency to remissions and by disorders of the digestive and nervous systems.

Etiology. This disease occurs most commonly in middle life being unusual before the age of 30 years. It is about equally common in men and in women. A very important part of the disease is the lack of a normal secretion of gastric juice. There is no free hydrochloric acid in the stomach, and

sometimes there is achylia.

Symptoms and Signs. The disease has an insidious onset, the patient slowly losing strength and vigour. He gradually becomes more and more pale, and the skin develops a peculiar lemon yellow tint. There may be an icteric tinge to the sclerae. Palpitations, soreness of the tongue, swelling of the ankles, and perhaps anginal pain are common. There may be failing vision due to optic nerve atrophy. Occasionally, when the haemoglobin is very low, there are haemorrhagic tendencies, and petechiae may be present. The spleen and liver may be palpable. Gastrointestinal symptoms are frequently present. There may be dysphagia, anorexia, vague dyspepsia, or even nausea and vomiting, and there is frequently a chronic, intermittent diarrhoea. As a rule, there are early in the disease paresthesias of the hands and feet, sensations of tingling and numbness which will not respond to rubbing. Loss of vibration sense in the extremities is almost invariably the earliest evidence of lesions of the spinal cord. The blood picture is fairly characteristic but should not be entirely relied on for diagnosis. It varies somewhat with the severity of the case, and with the presence or absence of a remission or an exacerbation. On the average, the erythrocyte count is around 3,000,000 per c.mm, of blood, but it may go as low as 500,000. (The normal number of red blood cells is about 5,000,000 per c.mm.).

Treatment. The specific treatment of pernicious anaemia involves the administration of liver, extracts of liver or of gastric mucosa. Liver extracts can be administered by mouth or intramuscularly. The dose of liver extract varies somewhat with the individual patient according to the severity of his anaemia and other factors. Therefore, the dose must be determined mainly by trial. As a rule, however, it is sufficient even in the case of a patient in severe relapse to give 45 to 60 units of injectible liver extract intramuscularly the first day and 15 units each week until the blood count and blood smear are normal. After the blood has become normal, usually in 6 to 8 weeks, a maintenance dosage is established. This is the amount necessary to keep the blood picture normal, and is usually 15 units, injected every two, three or four weeks. The intramuscular route is more widely used because it is more effective and less unpleasant. At present the parenteral route is used quite often for the administration of Vitamin B_{12}. This vitamin is the proper building material for the active anti-anaemic substance contained in the liver. The oral administration of Vitamin B_{12} is of little use because there is lack of an intrinsic factor (gamma-nucleoproteid) in the organism of the patient and absorption of the drug cannot take place. The treatment is started with the dose of 30-50 micrograms and then minimum effective doses are given. Whatever therapeutic method is employed it is essential that the erythrocyte count be maintained at 5,000,000 or more per c.mm, of blood, especially in patients with neurologic complications. The general treatment of pernicious anaemia must include plenty of rest, and an abundant diet. Occasionally, it becomes necessary to supplement the diet with adequate doses of iron, in order that the production of haemoglobin may keep pace with the rapid production of erythrocytes. Vitamin B_{12} is possibly of value in cases of subacute combined degeneration of the spinal cord. Most of the symptoms of pernicious anaemia improve rapidly under specific treatment. The administration of dilute hydrochloric acid in doses of 2 to 4 cc. in a glass of water sipped with meals is sometimes, however, a valuable aid to digestion and prevention of diarrhoea. Rarely it is necessary to give a blood transfusion at the beginning of therapy in order to relieve air hunger and profound weakness. The patient should remain in bed when the anaemia is severe. Increasing amounts of exercises should be carefully prescribed as strength returns. Physiotherapy is important in patients with spinal cord involvement. Certain principles of treatment are observed in all anaemias. Foremost among these is an adequate diet. This must include an abundance of foods containing vitamins and blood building sub-stances, particularly iron. The foods known to have the highest content of blood building substances are liver, kidney, beef muscle, chicken gizzard, peaches, apricots and prunes. Other fruits and the leafy vegetables are less important, and the remainder of the dietary has little blood-building influence although it may be important for other reasons.

КОНТРОЛЬНА РОБОТА №38

Translate into Ukrainian

ENZYMES

The rate of certain chemical reactions may be greatly accelerated by the presence of some other substance which does not play any part in the reaction or in the final product. In the chemistry of the plant and animal metabolism, a number of such catalysts exist and they play an important part in the regulation of the various chemical reactions. They are known as enzymes.

An enzyme is an organic compound, frequently a protein, capable of accelerating or producing by catalytic action some changein a substrate for which it is often specific. The substance on which an enzyme acts is called the substrate.

There is a view that enzymes are not true compounds but mixtures because a second substance (called co-enzyme) is necessary for many enzymes to perform their work. Enzyme action is one of extreme complexity.

Previously catalysts were called ferments in connection with the process of fermentation (fruit juices and sugars were converted into ethyl alcohol). Pasteur showed that the process of fermentation was brought about by the presence of certain microorganisms of which the most important was yeast.

All fermentations are brought about (either directly or indirectly) by the activities of animal or vegetable organisms. The most familiar ferment, of course, is yeast. The name enzyme is now generally employed for all organic catalysts. It is a soluble colloidal organic catalyst produced by living organisms. As a rule, each enzyme is capable of acting upon only one substrate.

The names of enzymes end in **-ase** (an enzyme). This suffix is used in forming the names of enzymes, indicating the general nature of the substrate, the type of reaction catalyzed.

There are about fifty enzymes known to play a part in plant metabolism. Some of the more important enzymes are the following:

Enzyme	**Substrate**	**End Produet**
Enzymes hydrolizing Carbohydrates		
Sucrase (Invertase)	Sucrose	Fructose and glucose
Maltase	Maltose	Glucose
Cellobiase	Cellobiose	Glucose
Lactase	Lactose	Glucose and galactose
Amylase (Diastase)	Starch and dextrins	Maltose
Cellulase	Cellulose	Cellobiose
Inulase	Inulin	fructose
Enzymes hydrolyzing Esters		
Lipase	Fats	Glycerol and fatty acids
Chlorophyllase	Chlorophyll ά + alcohol	Ethyl chlorophyllide and phytol
Enzymes hydrolizing nitrogen compounds		
Proteases	Proteins	Amino acid (or intermediate products)
Peptidases	Polypeptides	Amino acids
Urease	Urea	Carbon dioxide and ammonia

The majority of enzymes are hydrolytic and exhibit the property of reversibility, that is they are able to start a chemical reaction in either direction (for example, amylase).

If enzymes are to work efficiently they require a particular degree of acidity or alkalinity of the substrate. The best (or optimum) temperature for most enzyme activity is between 40° and 45°C.

There are some enzymes concerned in oxidation and reduction processes. Many of them operate simultaneously on two different substances (one is oxidized while the other is reduced).

Enzymes causing oxidation reduction	**Substrate**	**End Product**
Zymase	Hexose sugars	Ethyl alcohol and carbon dioxide
Oxygenases	Organic compounds + oxygen	Organic peroxides + water
Peroxidases	Phenol compounds + hydrogen peroxide	Oxidized phenol compounds + water

There are also dehydrogenases and catalase among the more important enzymes. There is a whole series of dehydrogenases commonly present in plant tissue (for example, potato tuber tissue) and they appear to perform the process of an intermolecular transfer of hydrogen rather than of oxygen. Catalase is present in all plant and animal tissue. It reduces hydrogen peroxide to water and molecular oxygen.

Enzymes are of great significance for life as well as for industrial chemistry.

EXERCISES

I. *Answer the following questions*:

1. What role do the enzymes play in the plant and animal metabolism?
2. What kind of a compound is an enzyme?
3. Which is the most familiar ferment?
4. How are all fermentations brought about?
5. How are the names of enzymes formed?
6. What is a substrate?
7. Do enzymes require any special conditions?
8. Which enzymes show the property of reversibility?
9. Which series of enzymes are commonly present in plant tissue?
10. Why are enzymes of great significance for life?

II. *Give the opposites for*:

living	active
organic	presence
end	frequent (adj.)
complexity	true

III. *Supply the appropriate tense in the following sentences*:

1. He ... (to prepare) the exercise before he came.
2. After I had written my exercise I ... (to read) the new reading unit.
3. What... (to read) you ... when I called you?
4. He.., (to answer) the question before I left the room.
5. Did you hand in the paper after you ... (to write) it?
6. Pasteur ... (to find) that lactic fermentation ... to(cause) be bacteria.
7. He ... (to. prepare) his report when I entered.
8. After I ... (to see) him, I knew his name.
9. What... (to do) when you entered the laboratory?
10. He... (to write) the answer before I collected the test-papers.

IV. *Fill in the missing words*:

1. Previously catalysts were called ferments ... connection ... the process ... fermentation.
2. ... a rule, each enzyme is capable ... acting ... only one substrate.
3 Enzymes are ... great significance ... life as well as ... industrial cnemistry.
4 Enzyme action is one ... extreme complexity.
5. All fermentation are brought ... either directly or indirectly ... the activities ...animal or vegetable organisms.

VI. *Suggestion for Composition Exercises (5-10 sentences each):*
1. Organic catalysts.
2. The most familiar ferment – yeast.
3. Plant metabolism.
4. Industrial chemistry.
5. My plans for the future work…

Translate into Ukrainian. Put 10 questions to the text.

RHEUMATIC FEVER

Rheumatic fever, although its exact cause is unknown, is believed to be a systemic infection. It is closely associated with infections caused by hemolytic streptococci. Rheumatic infection may involve the endocardium, myocardium, pericardium, central nervous system, lungs, pleura, peritoneum, and other structures in addition to the joints. The infection begins most commonly in childhood and adolescence, but adults of all ages are also affected. Children under 5 years of age rarely have definite joint manifestations. The disease is chronic and is characterized by long periods of quiescence. There are occasional exacerbations. From the clinical viewpoint, the infection may be of various degrees of severity. In some cases, there is little to indicate the original infection; a positive history of the original infection is obtained in only about 50 to 65 per cent of cases of rheumatic valvulitis. The first infection may be: 1) asymptomatic; 2) a prolonged unexplained fever followed by cardiac manifestations; 3) characterized as "growing pains"; 4) manifested as chorea; 5) indicated by frequent nosebleeds; or 6) accompanied by acute arthritis (acute rheumatic fever). The usual case of acute rheumatic fever is sudden in its onset with fever (101° to 104°F.—38.3° to 40°C.) which has slight morning remissions. A sore throat may have been noted from 1 to 4 weeks before. The fever is accompanied by drenching acid sweats and the involvement of many joints, most frequently the knees, ankles, shoulders, wrists, elbows, hips, hands, and feet. The joint involvement is migratory. One or more joints become painful, red, hot and swollen. After a few days, they improve, while other joints begin to show the same process. There is usually not enough fluid in the joints to enable clinical detection, the main involvement being periarticular. After a few weeks (usually 4 to 6), the condition subsides without residual damage to the joints (monocyclic form), or there may be a repetition of the whole process (polycyclic form). Occasionally, some pain and stiffness, most marked in the mornings, persist for several weeks. Erythema marginatum occurs in about 10 per cent of cases. The lesions are flat, occasionally raised, are pink with 'pale centres, and are located on the arms, in the axillae, and over the back, chest or abdomen. Erythema nodosum and myalgia may occur. Subcutaneous nodules may appear singly or in crops in the regions of the joints or tendons in 10 per cent of cases. They are more common in children.

Prognosis. Acute rheumatic fever may be followed by complete recovery, but many patients suffer lasting changes in the heart. Periodical exacerbations of the infection usually increase the extent of cardiac damage. Occasionally, rheumatic fever is overwhelming and death occurs within a comparatively short time, This occurs, with little if any joint involvement, most often in children.

Treatment. The patient is put at absolute rest in bed. The Joints are kept quiet, by means of splints if necessary. The usual supportive and symptomatic measures used in the treatment of any febrile illness are employed. The nutrition of the patient is important. A diet adequate calories should be given; in the early stages of the illness, liquids lands soft diets are preferable, especially if the patient complains of constitutional symptoms. For underweight patients the caloric intake should be

aimed at producing a gain in weight. If the patient is of normal weight or obese, no advantage accrues from a diet which causes further increase; such a diet may lead to an unnecessary circulatory burden. Fluids should be given in adequate amounts; in the presence of high fever larger amounts may be indicated. As in all febrile diseases, fluids which promote distension are best avoided. Milk and fruit juices may have to be limited on this account. Unless cardiac insufficiency is present or imminent, the salt intake should be that allowed normally. If an adequate diet is taken, supplementary vitamins are not essential, but a multivitamin preparation when necessary may be given. Salicylates afford great symptomatic relief of pain in the joints and often cause the fever to subside. Since this is, except to a limited extent, not true in other joint affections, the response of the joint symptoms to salicylates is a kind of therepautic test. At least 6.5 grams, or better, 60 milligrams a day of sodium salicylate per pound of body weight should be given. If minor toxic symptoms of salicylism appear, the dose of the drug is reduced by one-half; but its use is not stopped. If the salicylate causes much nausea, it can be given as a single dose via the rectum in normal saline. Acetylsalicylic acid (aspirin) is of similar value. These drugs probably do no good after the joint manifestations and fever subside. It has been shown recently that large doses (24 grams daily) of para-aminobenzoic acid make possible a higher concentration of the salicylate in the blood. There is no benefit to be derived from the use of sulfonamides or penicillin.

At present in severe cases along with salicylates, the ACTH (adreno-cortico-tropic hormone) or cortisone is used. The administration of these drugs calls for the clinical observation of the case.

Tonsillectomy is usually advocated after the fever disappears, because of the frequent association of this disease with tonsillitis. This procedure should probably, however, be reserved for patients with definitely infected tonsils or a history of recurrent tonsillitis. It must be remembered that tonsillectomy does not prevent streptococcal nasopharyngitis, which may induce a rheumatic recurrence.

Rest in bed should be maintained until all evidence of infection has subsided. One of the best guides is the sedimentation rate. Some physicians advocate, for children or young adults who have had rheumatic fever, the prophylactic daily use of from 0.5 to 1.0 gram of sulfadiazine during the period of prevalence of streptococcal infections.

КОНТРОЛЬНА РОБОТА №39

Translate into Ukrainian

BASES

Bases constitute the third great class of compounds. The most important bases are: sodium hydroxide, potassium hydroxide, calcium hydroxide, ammonium hydroxide.

Every base contains OH. It means one atom of oxygen and one atom of hydrogen held in combination. The OH group is called the hydroxide (hydroxyl) radical. This radical serves to identify bases. Bases also contain a metal. Ammonium hydroxide is an exception because the NH4 radical acts like a metal and is, therefore, called a metallic radical.

The hydroxide of a metal or of a metallic radical is a base.

Most of the bases are insoluble. Those that are soluble are sometimes called alkalis- The hydroxides of active metals such as potassium and sodium are alkalis.

The aqueous solution of a base possesses the following properties :

1) bitter taste like soap and feels slippery to the fingers;
2) it changes the colour of litmus from red to blue;
3) it is a conductor of electricity;
4) it reacts with acids to form water and salt,

e.g. base + acid === salt + water

When both the base and the acid have lost their characteristic properties the resulting solution is called neutral. Bases ionize in solution, forming metal ions and hydroxide ions (OH-). Therefore, a base is a substance which contains hydroxyl as a negative radical and, in solution, gives hydroxyl ion.

Thus the mixture of equivalent amounts of hydrochloric acid and sodium hydroxide solutions gives a reaction which is complete although no substance concerned in the reaction has escaped either as a precipitate, or as a gas. All of the peculiar properties of the original components (action on litmus) disappear, and we are left with a solution of common salt.

The products are common salt and water. The neutralization was caused by combining the hydrogen ion (H+) of the acid with the hydroxide ion (OH-) of the base to form water, thus removing the ions causing basic and acidic reactions.

Sodium hydroxide is a common base. It is the hydroxide of a very active-metal and is highly soluble in water. In dry state it is a white solid It has a corrosive action on organic tissue and is called caustic alkali for this reason. Sodium hydroxide (or caustic soda) is the cheapest strong base. It is used in soap making, in bleaching solutions, in making paper and refining petroleum.

Ammonium Hydroxide

This is a soluble weak base formed by the union of ammonia and water. It is very unstable. Ammonium hydroxide solution (2-12%) is sold under the name of household ammonia. It is usel in washing and cleaning and to soften the water. Do not confuse ammonia and ammonium. Ammonia is the gas, ammonium is a group. This radical is found only in compounds. The suffix um was given to it because its compounds (salts etc.) resemble the compounds of metals. The **um** is the recognised suffix in chemistry for a metal.

Nomenclature for Inorganic Compounds

The general rules for the nomenclature are:

Binary compounds:

The positive element (metal) is named first, and followed by the electronegative element (non-metal).

Metal suffixes:

— *ous* indicates the lower valence, as ferrous —
— *ic* indicates the higher valence, as ferric —

Nonmetal suffixes:

— *ide* as oxide, hydroxide, chloride, nitride, sulfide (sulphide)

Ternary compounds:

acids: — *ous* acid, indicating a lower valency, as chlorous, sul- I
furous (sulphurous) acid.
— *ic* acid, indicating a higher valency, as chloric, sulfuric (sulphuric) acid.

If there are more than two stages of oxidation, then the following rules are in use:

hypo — ous, the acid of lowest valency, as hypochlorous acid
per — ic, the acid of highest valency, as perchloric acid.
salts: —ite, when derived from an ous-acid, as chlorite, sulfite
(sulphite).
— *ate*, when derived from an ic- acid, chlorate, sulfate
(sulphate).

EXERCISES

I. *Read the following sentences and make questions*:

1. Every base contains OH and a metal.
2. A base is a substance which contains hydroxyl as a negative radical
and, in solution, gives hydroxyl ion.
3. Sodium hydroxide has a corrosive action on organic tissue and is called caustic :
alkali for this reason.
4. Sodium hydroxide is used in soap making, in bleaching solution, in making
paper, etc.
5. Ammonium hydroxide is a soluble weak base formed by the union of ammonia
and water.
6. Ammonium hydroxide is used in washing and cleaning and to soften the water.
7. The NH4 radical is found only in compounds.

II. *Use any of the following words in the following sentences* — sweet, sour
sick, pleasant, bad.

1. Old meat smells ...
2. Oranges taste ...
3. That voice sounds ...
4. The old bread tastes...
5. The music sounds ...
6. Lemons taste ...
7. The dead flowers smell
8. At sea he feels ...
9. These flowers smell..
10. Decayed food tastes ..

III. *Fill in the missing words*:

1. OH means one atom of oxygen and one atom of hydrogen held ... combination.
2. The aqueous solution of a base feels slippery ... the fingers and has a bitter taste like soap.
3. It reacts ... acids ... form water and salt.
4. Sodium hydroxide ... dry state is a white solid.
5. It has corrosive action ... organic tissue and is called caustic alkali … this reason.
6. Ammonium hydroxide solution is sold ... the name of household ammonia.
7. There is one simple equation ... all neutralizations of strong acids and bases.

IV. *Complete the following sentences*:

1. The OH group is called the h------l r--—"l.
2. The hydroxide radical serves to identify b-s.
3. The aqueous solution of a base changes the colour of litmus from r-d to b--e|
4. It reacts with acids to form w---r and s---l. ;

5. Sodium hydroxide is called caustic alkali or c-----—c s--a. rt
6. Ammonium hydroxide solution is sold under the name of h-------d a---a.
7. Household ammonia is used in washing and cleaning and to s--n the water
8. The recognized suffix in chemistry for a metal is u-.
9. The hydroxide of a metal or of a metallic radical is a b--e.
10..Those bases that are soluble are sometimes called a------s.

VI.*Suggestions for Composition Exercises (5-10 sentences each):*

1. Alfred Nobel.
2. A day in a soap factory.
3. The use of household ammonia.
4. The interest in ammonia.
5. My hobby - analytical chemistry.

Translate into Ukrainian. Put 10 questions to the text.

INFANTILE ECZEMA

This may be defined as an inflammation of the skin, primarily of non-infective origin. Boys are more often affected than girls and almost always the child is fair-skinned and blue-eyed, and above the average weight for the age. The appearance of fatness is due to a watery distension of the tissues, and in the event of a sharp attack of diarrhoea the loss of fluid in the stools produces a rapid and severe loss of weight. The anaemic appearance of many eczematous infants is likewise due to oedema rather than to actual blood changes.

Symptoms. The onset seldom occurs before the third month of life. The change from breast-feeding to a diet of cow's milk determines the onset in many cases, in others the rash first develops when the milk diet is augmented with other foods such as cereals and eggs. The rash first appears, and is most intense, on the forehead and cheeks. At first, the skin becomes red, and feels hot and dry, or may be thickened by oedema. Small papules and vesicles soon appear, and cause intense itching which the infant relieves by scratching until a thin serum exudes, or the skin may crack into minute fissures from which serum escapes. The serum dries into yellow crusts, and on the hairy scalp these may so coalesce that the head seems caked with them. Beneath the crusts, the skin is bright red, raw and moist. The distribution of the rash may be either patchy or diffuse. It begins on the forehead, the face and scalp are soon involved and within a short time the trunk and limbs may be affected The skin in the flexures and at the nape of the neck is often a favourite site. In older children, the back of the knees, the bend of the elbows and the front of the wrists are particularly likely to be affected with a dry itching eczema and the skin in these parts may feel much thickened. At times, there may be much irritation in the flexures without a visible lesion. Flexual eczema is almost invariably associated with asthma or allergic rhinitis which, in the presence of this skin condition, tend to be very resistant to treatment. The skin is very liable to become secondarily infected, usually as a result of scratching, and the appearance of eczema is then masked by a septic dermatitis. This is particularly troublesome when it causes fissures behind the ears, the skin in these parts remaining affected long after the rest has healed.

Causation. There are two main views: some attach the predominating importance to irritation of the skin by various external factors, others hold the sensitiveness of the skin to be due to various internal factors. Treatment is likely to be successful only when both views are taken into consideration.

External Factors. One of the most important factors in keeping up the rash is the constant scratching and rubbing. Other factors, such as sudden changes of temperature, exposure to winds or direct sunlight, washing with strong soaps and hard water, imperfect drying, and wearing rough or woolly clothing next to the skin, all help to aggravate the condition. It is probably the external factors which determine the distribution of the rash.

Internal Factors. There is a view that eczema is an allergic phenomenon, that *is* to say it derives from a hypersensitivity to foreign substances — usually proteins — with which the comes in contact. The proteins of food, especially milk (lactal bumin) egg, and wheat, are the chief offenders, and about two-third of eczematous infants give positive skin reactions to these or other proteins.

Proqnosis. Many children recover spontaneously towards the end of the second year, while in others, although a considerable -provement takes place, scattered patches continue to crop up throughout childhood. The tendency to diarrhoea seems to account for those fortunately rare instances of sudden death in infantile eczema. Another rare complication is the "varicelliform eruption" characterized by acute erythema. The severe degree of secondary septic infection which is usual should be dealt with by intramuscular penicillin, and the skin dressed with a solution of flavine.

Treatment. The protection of the skin — in order to prevent the infant from scratching and rubbing the skin, apply a face-mask and arm-splints. Each arm is splinted from the shoulder to the wrist by wrapping a strip of corrugated cardboard, held in position by light bandages, round the limb. These should be worn until the rash has subsided. The clothing next to the skin should be smooth, fine linen or cotton being the best. Before ointments are applied, any crusts should be removed. If bathing with warm olive oil does not get rid of them, a starch and boracic poultice should be used.

The poultice. Mix a tablespoonful of starch with a teaspoonful of boracic acid. Stir to a stiff paste with cold water, then pour in boiling water until the starch becomes translucent. Allow to cool into a jelly. Apply by spreading the jelly on clean linen, and leave on for an hour. Repeat until all crusts have come away. So long as the skin appears red and angry, a soothing ointment such as zinc cream, should be liberally applied as a protective covering.

When the acute inflammation has subsided, and in the more chronic forms producing rough thickened skin, crude coal-tar makes a most useful application, but its effect must be watched as it occasionaly reddens the skin.

Internal Treatment. A low intake of fat in the diet is advantageous. Of the two milk proteins, lactalbumin is the one to which infants are usually susceptible, and this may be removed from fresh milk by taking off the skin which forms after the milk has been boiled. The addition of hydrochloric acid to the milk is also beneficial, because of the aid it gives to protein digestion.

КОНТРОЛЬНА РОБОТА №40

Translate into Ukrainian

SALTS

Salts are the compounds formed when metals replace the hydrogen in acids.

Zinc replaces the hydrogen in dilute hydrochloric acid, forming zinc chloride, which is a salt.

The very same radicals that are combined in acids with hydrogen, appear also in salts.

The salts are the largest class of compounds in nature. Binary salts are those of the hydro-acids; they contain two elements, in naming them the suffix **ide** is in common use. Thus sodium chloride is a binary salt, one of the salts of hydrochloric acid.

Ternary salts contain three elements. Here the suffix **ate** is used to denote the salt of an oxyacid with an **ic** ending. The suffix **ite** is used when the acid has an **ous** ending. Thus sodium sulphate (Na_2S0_4 is a salt of sulphuric acid (H_2S0_4) but sodium sulphite Na2SO4) is a salt of sulphurous acid (H_2S0_3).

The most important of the nitrate salts is sodium nitrate. Sodium nitrate is prepared commercially by the reaction of nitric acid and sodium carbonate. Another member of this group is silver nitrate, used as a cauterizing agent and in the preparation of germicidal solutions.

Chloride

Sodium chloride or common salt (table salt) is the most abundant chloride occuring in nature.

Large deposits of this substance are found in various parts of the world. There are different methods of recovering and purifying it. Usually borings are made and water is forced down, forming brine that is pumped to the surface and afterwards evaporated for the crystalline salt. Salt has the property of absorbing moisture (deliquescence).

It is an indispensible article of animal food and it is used in making sodium carbonate, hydrochloric acid and chlorine. It is also used in freezing and preserving foods and exterminating weeds.

There is a group of salts of the halogen family (halides). Chlorine belongs to the halogen family along with fluorine bromide, and iodine.

Sulphates

The sulphates are salts of sulphuric acid. The most abundant sulphate in nature is gypsum. Its principal use is in making plaster of Paris and in the building industry.

Sulphuric acid forms with the trivalent metals complicated salts called alums (double salts). Potassium alum is a typical representative. It consists of potassium sulphate and aluminium sulphate.

Carbonates

The carbonates are salts of carbonic acid, a weak and quite unstable acid.

In this group of salts best known and most widely used is sodium carbonate or washing soda. It is important in the manufacture of glass, soap and sodium hydroxide and in softening water.

Sodium bicarbonate or baking soda. It is used in baking powders and medicines. Baking powder is a mixture of the bicarbonate and a weak acid, usually cream of tartar. Dough is caused to rise by the liberation of bubbles of carbon dioxide through the reaction of the bicarbonate and acid when water and heat are added.

There are many other groups of salts such as the phosphates-used as a fertilizer; the bromides, especially silver bromide is important in photography, other bromides have medicinal properties. Then there are the silicates indispensible in the manufacture of glass and cement. The borates are also among the many groups of salts.

Since there are a great many possible combinations of metals with acid radicals, the number of salts is very large. The majority of inorganic compounds belong to this class. Many of them are important substances for their usefulness in the home, in the human body, in the industries, and for medicinal purposes.

An acid and a base will always react to form water and a salt. And that is the process of making a solution neutral. The final products of complete neutralization possess no acid or basic properties.

Acids, bases, and salts are the only substances which form solutions in water that are able to conduct an electric current. As a group they are electrolytes. They are the only substances the molecules of which seem to be resolved into independent particles when they are in solution in water. This breaking up of molecules into independent particles when in solution is called dissociation or electrolytic dissociation, since the particles thus formed have electrical charges. The fact that these particles (ions) are electrically charged, as well as the nature and the amount of the charges they carry is explained on the basis of the electron constitution of matter. The positively charged ions are those each of which has lost one or more electrons which have been taken up by the other kind of ions in the solution and in this way these ions receive an equal number of negative charges. The amount of the charges carried by the ions is directly proportional to the number of electrons gained or lost, and hence is the same as the valence of the element or radical.

X-ray pictures of crystals have shown that most crystalline salts do not exist in the form of electrically neutral molecules but that they are composed of ions packed close together in an orderly arrangement. The ions are paired so, that in the orderly heap there are equal positive and negative charges and the substance as a whole is electrically neutral. The net result when the salt is dissolved in water is the same, because the strong electrical attraction that holds the ions together in the crystal is weakened by dispersion in the solvent and the ions are free to move about as independent particles. The positive and negative particles sometimes collide or they get so close together that electrical attraction asserts itself and they behave as one particle. This explains why salts, and other electrolytes, seem never to be completely dissociated into ions.

The more dilute the solution (the greater the proportion of water to salt) the less chance for attractive forces to hinder the free movement of ions, and the more complete will be the effective degree of ionization. Salts, as a rule, show a rather high degree of ionization (mercuric chloride is an exception).

EXERCISES

I. *Read the following sentences and make questions*:

I. The salts are the largest class of compounds in nature.
2. Salts are the compounds when metals replace the hydrogen in acids.
3. The suffix *ite* is used when the acid has an ous ending.
4. The most important of the nitrate salts is sodium nitrate.
5. Sodium chloride or common salt is the most abundant chloride occurring in nature.
6. Salt has the property of absorbing moisture.
7. Sodium chloride is an indispensable article of animal food.
8. Chlorine belongs to a group of salts of the halogen family.
9. The sulphates are salts of sulphuric acid.
10. Sodium bicarbonate is used in baking powders and medicines.

II. *Fill in the missing words*:

1. The carbonates are salts ... carbonic acid.
2. Sodium carbonate is important ... the manufacture ... glass, soap.
3. Binary salts: ... naming them the suffix *ide* is ... common use.
4. Sodium nitrate is prepared commercially ... the reaction ... nitric acid and sodium carbonate.
5. Sodium chloride is used ... freezing and preserving food.
6. Chlorine belongs ... the halogen family along ... fluorine, bromine, and iodine.
7. Sulphuric acid forms ... the trivalent metals double salts.

8. Dough rises ... the liberation ... bubbles ... carbon dioxide when we use baking powder.
9. The liberation of bubbles takes place ... the reaction ... the bicarbonate and acid when heat and water are added.
10. The silicates are indispensable ... the manufacture ... glass and cement.

III. *Complete the following sentences*:

1. Binary salts are those of the h---o-a---s.
2. In naming binary salts the suffix — is in common use.
3. Sodium nitrate is prepared commercially by the reaction of n----c a--d and s——m c-—— —e.
4. Silver nitrate is used as c---------g a---t and in the preparation of g---l s---s.
5. Another name for sodium chloride is c----n s--t or t---e s--t.
6. Salt has the property of absorbing moisture or d------ —— -e.
7. The principal use of gypsum is in making p-----r of P---S and in building industry.
8. A—-s or d----e s---s are complicated salts formed by sulphuric acid and the trvalent metals.
9. Sodium carbonate is also known as w-----g s--a.
10. Sodium bicarbonate is known as b----g s--a; it is a mixture of the b---------e and a weak acid, usually c---m of t----r .

V. *Suggestions for Composition Exercises (5-10 sentences each):*

1. Common salt is indispensable to man.
2. A visit to one of the salt mines.
3. The economical importance of sodium chloride.
4. The economical importance of gypsum.
5. My hobby — baking cakes.

Translate into Ukrainian. Put 10 questions to the text.

TRACHOMA

Trachoma is a chronic viral conjuctivitis associated with papillary hypertrophy, follicular increase, corneal vascularization, shrinkage of the lids and cicatricial changes. The accompanying discharge is very contagious. It has serious complications and sequelae.

Etiology. The etiological agent of trachoma is a virus, *Chlamydozoon trachomatis.* The trachoma virus can now be isolated in culture. The disease is most contagious in its early stages and may be spread through personal contact with a patient suffering from trachoma or indirectly by handling contaminated articles. Spread of the infection is through personal contact with a patient suffering from trachoma.

Symptoms and Signs. The symptoms depend on the character of the onset: whether very acute with exudate or insidious without exudate. In the acute form, there is blepharospasrum, larimation, oedema of the lids, swelling of the conjunctiva, profuse purulent discharge and follicles in the conjunctival folds and upper lid. In the insidious form, the patient may not be aware of the trouble until pannus begins. The classic division of the clinical course is into 4 stages.

The first stage, or period of onset, simulates acute catarrhal conjunctivitis. There is swelling of the lids and conjunctival congestion, and minute follicles are seen in the upper retrotarsal fold The follicles slowly increase in size for 3 to 4 weeks, when they take the appearance of true trachoma granules. These signs may be attended with either slight discharge or very profuse discharge. Cell inclusion bodies found in this stage are not diagnostic of trachoma.

The second stage is known as the hypertrophic stage, the stage of trachoma granules. The follicles of the palpebral conjunctiva have by this time enlarged and become surrounded by inflammatory papillae. They look like closely packed yellow stops surrounded by areas of red tissue. The closely adherent tarsal conjunctiva prevents them from becoming elevated. In the fold, follicles are arranged in rows pushed up to form dome-like swellings, at first beefy-red, then gray to yellow. Occasionally, granules are seen on the semilunar fold. In this stage, pannus begins with infiltration of

loops of vessels into the cornea between the epithelium and Bowman's membrane, chiefly in the upper part of the cornea. This process may advance to invade the upper half of the cornea; in very severe cases, the whole cornea may be occluded with vision reduced to light. Retrogression may take place and the cornea clear up with the re-establishment of much of the vision. This stage may last for months or years.

The third stage is known as the cicatricial stage. The papillae and follicles gradually shrink and disappear and are replaced *by* scar tissue. In the tarsal conjunctiva, the cicatricial process forms narrow, whitish bands parallel with the lid margins. This is *Te*-ferred to as trachoma white line. The cicatrix will depend on the amount and intensity of the hypertrophy that preceded it, and will often cause an incurving of the tarsal plate. The retrotarsal bolds, shrink and gradually become whitish, with a smooth surface and a much shortened zone of conjunctiva. The corneal complications due to pannus and inversion of the lids and hairs appear in this stage. Ulcers may develop in the pannus, affecting the corneal structure and leaving behind opacities of varying thickness and translucency. In this stage, trachoma heals itself by resorption of the infected tissue and replacement with scar tissue.

The fourth stage is that of healed trachoma, the stage of sequelae. The conjunctiva is smooth and whitish. The scarring is proportionate to the amount of inflammatory activity. If the ducts of the lacrimal glands are occluded, xerophthalmia may develop. Corneal ulceration may be present as a result of obliteration of vessels. Even the canaliculi may become stenosed. Shrinkage in the lids and retrotarsal folds is present with or without entropion.

Diagnosis. In the early stages, diagnosis is difficult. The presence of inclusion bodies in the scrapings stained with Giemsa stain differentiates it from purulent conjunctivitis and acute catarrhal conjunctivitis.

In the second stage, vernal palpebral conjunctivitis could be mistaken for trachoma, but the milky flat tops of the papillae and the eosinophils denote the presence of a vernal conjunctivitis. Ocular pemphigus is sometimes confused with the later stages of trachoma.

Treatment. Excellent results may be obtained from oral and local sulfonamide therapy or from systemic administration of the anti-infectious agents such as chlortetracycline or oxytetra-cycline.

Sulfadiazine ophthalmic ointment 5% — apply inside lower lid of affected eye 3 times a day.

Chlortetracycline has been used successfully as a 0.5% solution with 0.5% sodium borate in normal saline for treatment of ocular infections. Chlortetracycline is effective by mouth. The drug should be administered every 6 hours 1 to 2 Gm a day. The therapeutic concentrations usually are present in the blood 6 to10 hours after ingestion. The use of smaller doses reduces the incidence of gastrointestinal irritation. The clinical indications for oxytetracycline are practically the same as for chlortetracycline. The dosage is the same. The most commonly used preparation is the crystalline hydrochloride in capsule (50, 100, 250 mg) for oral use. The older procedures with copper sulfate or roller forceps are now rarely used. Surgical correction is sometimes necessary for lid deformities.

КОНТРОЛЬНА РОБОТА №41

Translate into Ukrainian

INTRODUCTION TO CHEMISTRY

Chemistry is the study of the different kinds of matter, called substances, and the changes involved when one substance is transformed into another. Matter exists in three different states: solid, liquid and gaseous.

The most important characteristic of a substance is its uniformity of composition and the fact that all samples of a specific substance show the same properties. There are two kinds of properties: physical — colour, taste, odour, touch (slippery, gritty etc.), density, hardness, solubility and ability to conduct electricity and heat; in solids the shape of their crystals is significant; freezing and boiling points of liquids. Chemical properties are the changes in composition undergone by a substance when it is subjected to various conditions. The various changes may be physical and chemical. The physical properties tend to be temporary. In a chemical change the composition of the substance is changed and new products-are formed. Chemical changes are permanent.

All pure substances may be divided according to their composition into two main clasess — elements (metals and nonmetals) and compounds. Aside from such wellknown metals as iron, lead, copper and silver, nearly all the less familiar metals have names ending in -um or -ium and can be distinguished from the non-metals in this way.

The number of different chemical compounds is enormous. They are complex substances that can be decomposed into two or more elements (for example, water is a compound).

Laboratory investigations of compounds follow two general techniques —analysis and synthesis. Analysis is breaking down (decomposing) a compound into its constituent elements. They in turn are then identified by qualitative analysis, and their relative weight or volume is determined by quantitative analysis. The direct opposite of analysis is synthesis. Synthesis means building a compound from simpler compounds or elements. For example— water is analyzed when an electric current is passed through it, decomposing it into hydrogen and oxygen; it is synthesized when hydrogen gas is burned into the presence of oxygen forming water.

New techniques and new instruments are devised and invented because the field of chemistry, like other fields, is a growing subject

The Atomic Structure of Matter

All matter consists of atoms. The exceptional kinds of matter are the elementary particles from which atoms are made (electrons, protons, neutrons) and similar sub-atomic particles (positrons, mesons). Atoms are the structural units of all solids, liquids, and gases.

An atom consists of a central nucleus plus one or more electrons. Nucleus is small, heavy with positive electrical charge. Electron is light, with negative electrical charge. An aggregation of atoms forms a molecule. The molecules of different chemical substances contain varying numbers of atoms, bonded tightly together Therefore the number of atoms in a molecule varies with the compound.

A symbol is used to represent an atom of an element, as well as the element itself. For example, I represents the element iodine and the elementary substance. H2O stands for water-— the molecules of which contain two hydrogen atoms and one oxygen atom.

Classification of Common Types of Analysis.

Breaking down a compound into the elements of which it is composed is called analysis. The word assay is now applied to analysis in general but in particular it means the analysis ot pharmaceutical and official drugs. Assaying by dry methods is dry-assay and by wet methods it is wet-assay. An assay balance is also called an analytical balance.

The process of building up a compound from the elements is known as synthesis. Synthesis is therefore the reverse phenomena of an analysis.

Qualitative analysis means the detection of the kind or nature of an element or compound in a substance.

Qualitative (detection of the kind of substances present):

chemical by means of precipitation or wet method;
thermal by means of flame tests and blowpipe analysis;
optical by meaJis of spectroscopic »and crystal structure;
electrical by means of electrolysis; high frequency spectra;
mechanical by means of microscope analysis; specific gravity y hydrometers; biochemical by means of microorganisms (bacteria, yeasts) .

Quantitative analysis is the determination of the amount or quantity of an element or compound in a substance.

Quantitative (determination of the amount of substances present): mechanical by means of gravimetric methods (weighing the amount)
volumetric methods (titrating the amount);
gas-volumetric methods (measuring the quantity of gas);
thermal by means of combustion, and the absorption of the combustion gases; electrical by means of conductometry, pptentiometry, polarography; mass spectra;
optical by means of colorimetry, nephelometry; fluoroscopy.

EXERCISES

I. *Answer the following questions*:
1. What is chemistry?
2. What are the states of matter?
3. What kind of properties are there?
4. How do we distinguish substances?
5. What techniques are used in laboratory investigations of compounds?
6. What is analysis? synthesis?
7. Is the field of chemistry growing?
8. What does matter consist of?
9. What forms a molecule?
10. What is used to represent an atom of an element?

II. *Give opposites of the following:*

Decompose	boiling	heavy
Hardness	temporary	positive
Heat	analysis	tight
Solid	presence	complex

III. *Fill in the missing words*:
1. Sometimes one substance is transformed ... another.
2. All pure substances may be divided according ... their composition ... two main classes.
3. ..*all* the less familiar metals have names ending ... *-um* or *-ium.*
4. Constituent elements ... turn are identified ... qualitative analysis.
5. Water is analyzed when an. electric current is passed ... it.
6. Water is synthesized when hydrogen gas is burned ... the presence ... oxygen,
forming water.
7. Complex substances can be decomposed ... one or two elements.
8. Decomposing means breaking ....
9. The number ... atoms ... a molecule varies ... the compound.
10. Symbols stand ... substances.

IV. *Write sentences with the following words:*
near — nearly hard-hardly late -lately

VI. *Suggestions for- Composition Exercises* *(5-10 sentences each):*
1. Inorganic chemistry and industry.

2. The importance of chemistry for the students of pharmacy
3. Chemistry in the Middle Ages.
4. Progress in chemistry and consequences.
5. A day in a chemical laboratory.

Translate into Ukrainian. Put 10 questions to the text.

SYMPATHETIC OPHTHALMIA

Sympathetic ophthalmia (sympathetic uveitis) is a special type of plastic inflammation of the uveal tract in one eye as a result of a similar inflammation in the opposite eye.

Etiology. The causative factor is usually a perforating wound of the eyeball, of traumatic or operative origin. Wounds about the ciliary body are most dangerous. Retained intraocular foreign bodies may set up the inflammation many months or even years after injury.

Pathologic Considerations. The pathogenesis has not been definitely settled. Theories have been held that pathogenic organisms are transmitted to the sympathizing eye by way of the optic chiasm or the ciliary nerves and vessels. The anaphylactic reaction theory holds that the body becomes sensitized to uveal pigment after injury, and that therefore the opposite eye, the only place with uveal pigment, sets up an inflammation. This theory may explain the rare cases of sympathetic ophthalmia following intraocular tumour. The generally accepted belief is that some living organism is present in both eyes. The exciting eye has an intense infiltration with mononuclear cells. In the early stages lymphocytic infiltration dominates, and this is later followed by the appearance of plasma cells, epitheloid cells and giant cells. Infiltration is most intense about the wound, but most of the uveal tract is involved. The exudate is a fibrinoplastic type that involves the ciliary body and iris, and forms dense posterior synechiae. The optic nerve and its sheath often show round-cell infiltration.

Symptoms and Signs — appearing in the second, or sympathizing, eye are photophobia, lacrimation, dimness of vision, some pain, congestion and tenderness in the ciliary region. In insidious cases, the symptoms are less marked. Objective signs are: deepening of the anterior chamber, contraction of the pupil, ciliary congestion, punctate deposits on the posterior surface of the cornea. Slit-lamp study of the cornea, aqueous and lens capsule at frequent intervals is necessary when an attempt is being made to save an injured eyeball. The vitreous body shows opacities, and if the media are sufficiently clear changes in the retina and choroid may be seen.

Course and Prognosis. The course depends upon the extent of the pathology, the type of treatment and the stage at which treatment is begun. Patients treated early have a better chance of recovery or of saving vision. Patients seen later, those with extensive pathological changes, have progression until vision is completely lost. Recovery is slow and may take many months. Optic neuritis is sometimes present.

Treatment. Prevention is most important. An injured eye that is so badly damaged that no vision will be retained should be enucleated. When vision is present in the injured eye, the course of action becomes more difficult. If there are no signs of irritability in the good eye, one is justified in waiting and keeping the patient under close observation. After sympathetic inflammation appears, the exciting eye may ultimately possess better vision than the sympathizing eye. The situation calls for careful judgment because the sacrifice of an eye that might be the only seeing eye would be a calamity. If the exciting eye is blind, has only light perception and poor light of form projection, it must be enucleated. Enucleation is the operation of preference in these cases, but in eyes involved in panophthalmitis, evisceration is the operation of choice. For the inflammation of the eye, atropine must be used and wide dilatation of the pupil maintained. Foreign protein therapy may be of great value at an early stage, from 4 to 6 injections being given at 3 day intervals. Large doses of sodium salicylate, 10 to 13 grams daily, are given from the start. For children, this dosage is modified. If secondary glaucoma develops paracentesis may be advisable.

КОНТРОЛЬНА РОБОТА №42

Translate into Ukrainian

OXYGEN

Oxygen is a most interesting as well as useful substance. We depend upon it for life as in its absence we suffocate; for heat because wood, coal and gas do not burn without it; and for light when oil, gas, or a candle is used.

Nearly 50 per cent of terrestrial matter is oxygen. Water contains about 89 per cent, the human body over 60 per cent;and common materials like sandstone, brick, limestone more 50 per cent of this element. One-fifth by volume (nearly one - fourth by weight) of the air is free oxygen.

Physical Properties of Oxygen

Oxygen is a colourless gas, without taste or odour. Compared with hydrogen, the lightest of all gases, however, it is nearly 16 times as heavy. It can be liquefied by compression, provided its temperature is first brought down below —118° (its critical temperature). The critical temperature of a gas is the temperature **below** which it must be cooled before it can be liquefied by any pressure, no .matter how great.

Oxygen dissolves slightly in water: 3 volumes of oxygen in 100 volumes of water -at 20°. This solubility of oxygen in water is, in some ways, its most important physical property. Fish obtain the oxygen for their blood from that dissolved in the water Man (and breathing animals) cannot take oxygen of the air into the system, if it does not first dissolve in the moisture contained in the walls of the air sacs of the lungs, and then pass inward in a dissolved state to the blood.

Liquid oxygen has a pale-blue tint. In an open vessel (that is, at the pressure of one atmosphere) its boiling point is —l82,5 When more strongly cooled, it freezes to a snow-like solid|

In chemical work there are only six physical properties usually mentioned for each gas: colour, odour, taste, density (referred to some -common gas such as air, oxygen, or hydrogen as a standard) liquefiability (whether it is easy or difficult; with oxygen it is difficult), defined by the critical temperature, solubility (usually in water only).

Chemical Properties of Oxygen

All the familiar metals (excepting silver, gold, and platinum) combine, when heated, with oxygen to give oxides.

Non-metallic elements — sulphur burns in oxygen with a blue flame giving a gaseous oxide (sulphur dioxide) with a well known odour. Phosphorus blazes very energetically, forming a powdery oxide — phosphorus pentoxide. Burning carbon (in the form of charcoal or hard coal) glows brilliantly and is burnt up It leaves an invisible, odourless gas—carbon dioxide. A stream of hydrogen burns with a very hot flame in oxygen, producing steam, which condenses on the cooler walls of the containing vessel as droplets of liquid hydrogen oxide or water.

Compound substances, if they are composed of elements which combine with oxygen, are able themselves to interact with oxygen. Usually, they produce a mixture of the same oxides which each element, separately, would give. For example: carbon disulphide burns readily, giving carbon dioxide and sulphur dioxide, just as carbon and sulphur, separately.

A Test for Oxygen

If a piece of glowing charcoal is placed, in a jar of oxygen, it bursts into flame. Pure oxygen is recognized by the fact that a splinter of wood, glowing at one end, bursts into flame when introduced into the gas. Only one other gas (nitrous oxide) behaves similarly.

Combustion and Oxidation. Rapid union with oxygen (with evidence of a high temperature) is called combustion. Slower union with oxygen (for example — rusting of metals) is called oxidation. Slow oxidation, with accumulation of the resulting heat
is spontaneous combustion.

Uses of Oxygen

1. The oxygen of the air taken into the body breathing is used to oxidize the foodstuffs absorbed during digestion. The material products are carbon dioxide and water but the important product is the heat given out which keeps the body warm.

2. Oxygen compressed in steel cylinders is used when breathing stops or is poor (asphyxiatlon, pneumonia), and to renew the supply in submarines.

3. If there is a good flow of river water the organic matter (sewage discharges) is oxidized, bacteria (disease producing) disappear and the water may be as suitable for drinking as before the sewage entered This removal of organic matter from sewage is partly a process of decay which is in large part slow oxidation promoted by bacteria and other organisms.

Decay is a chemical process because substances with different properties and chiefly carbon dioxide and water, are produced.

EXERCISES

I. *Answer the following questions*:

1. Why is oxygen of extreme importance?
2. "What are the physical properties of oxygen?-
3. How do fish obtain the oxygen for their blood?
4. In what form does the oxygen of the air reach the blood in man?
5. What are the chemical properties of oxygen?
6 When do oxides form?
7. What is carbon dioxide?
8. Do you know any test for oxygen?
9. How is pure oxygen recognized? Which gas behaves similarly?
10. What is combustion? oxidation?
11. What keeps the body warm (animal, human)?
12. What is the purpose of compressed oxygen in steel cylinders?
13. How is river water made clear and even suitable, for drinking?
l4. What promotes decay?
l5. Is decay a chemical process? Why?

II. *Give as many nouns as you know ending in* ***lel*** for example:droplet, plantlet

III. *Revise adjectives and adverbs — Degrees of Comparison.*

IV.*Fill in the missing words*:

1.It We depend ... oxygen life.
2.. Oxygen can be liquefied ... compression;
3. The solubility ... oxygen ... water is, ... some way, its most important physical property.
4. Oxygen can be liquefied ... any pressure, no matter how great but its temperature is first brought ... to its critical temperature.
5; A stream ... hydrogen burns ... a very hot flame ...oxygen.

VI. *Suggestions for Composition Exercises (5-10 sentences each):*

1. Oxygen — means Life.
2. High-mountain climbing.
3. Rescue work and equipment.
4. Submarine workers.
5. A day in the life of a diver.

Translate into Ukrainian. Put 10 questions to the text.

ACUTE TONSILLITIS

Etiology. Acute tonsillitis may be either primary, in which the tosillar inflamation is the essential thing, or, being associated frequently with pharyngitis, rhinitis, sinusitis and tracheobronchitis, it may be a part of more generalized inflammation of the upper respiratory tree. Most of the infections are due to hemolytic streptococcus, of which there are many types having many degrees of virulence of which group A is the most prevalent. The majority of cases occur during the winter and spring months,and young people are particularly susceptible.

The disease may become epidemic as the result of carriers living in crowded quarters with suceptible individuals. The disease is often a variant of scarlet fever without the rash.

Symptoms and Signs. Acute tonsillitis begins with malaise, a sensation of chilliness, headache, anorexia, and fever which may be mild or high (especially in children). The course or severity of the disease varies, largely with the degree of virulence of the infecting organism and the amount of resistance of the patient. The throat is painful on swallowing, and there may be soreness and tenderness on each side of the neck at an angle of the jaw. In that region, the lymph nodes may be moderately enlarged and tender. The tonsils are usually swollen and red, and their crypts are filled with white or yellow plugs (follicular tonsillitis). They may or may not exude pus when compressed. The uvula and pharynx are often reddened and oedematous and covered with tenacious mucus. A moderate leukocytosis is frequently found. The patient may be quite ill or he may be able to carry on at his daily routine. The disease usually lasts a few days and then slowly subsides-. Diseases to be differentiated are: diphtheria, infectious mononucleosis and Vincent's angina.

In virulent forms of infection there may be a very stormy course with high, septic type of fever for as long as 10 to 14 days. Local lesions may suppurate and may even lead to distant septic infarcts. In such cases, there is probably a septicemia, and there may be petechiae. This form is often called septic sore throat and may occur epidemically. Occasionally, acute glomerulonephritis follows an attack of acute tonsilitis. Peritonsillar abscess sometimes develops otitis media and erysipelas are other occasional complications.

Treatment. The treatment is symptomatic- and supportive. An abundance of rest, fluids and nourishment is important. The bowels should be kept open by the use of mild laxatives. An ice collar to the neck will give some relief from pain. Frequent small feedings are beneficial, because they necessitate more frequent swallowing which seems to keep the tissues of the throat more pliable and actually lessens the pain of swallowing. Gargles are widely used but they probably have very little effect. Any warm, alkaline solution (bicarbonate of soda and salt) can be used every 2 or 3 hours as a gargle. Analgesics such as aspirin or combination of aspirin, phenacetin and codeine are given for the relief of headache and malaise. In severe cases, and especially in cases of the septic form, penicillin is preferred to the sulfonamides although the latter are useful. Penicillin is given in doses of 300,000-600,000 units in repository form every 24 hours. The patient should preferably be isolated. After recovery is well advanced, it is advisable to consider tonsillectomy, since recurrences are common.

КОНТРОЛЬНА РОЛБОТА №43

Translate into Ukrainian

HYDROGEN

Hydrogen is of interest on its own account because it is often used in filling balloons and nearly half (by volume) of ordinary illuminating gas is free hydrogen.

Physical Properties

Hydrogen is a colourless, tasteless, odourless gas. One liter at 0° and 760 mm. weighs 0.09 g., while one liter of air under the same conditions weighs 1.29g. Air is thus more than 14 times as heavy, and hydrogen can be poured .upwards (like in filling balloons). The critical temperature is very low —234°, all other gases except helium, solidify easily when led into a vessel surrounded by liquid hydrogen.

Hydrogen is even less soluble in water than oxygen, 1.8 volumes of the gas dissolving in 1000 volumes of water at 20°.

Chemical Properties

Hydrogen is a very widely distributed element and its most important compound is water. There are more compounds of hydrogen known than of any other element, perhaps carbon is a close second.

Free hydrogen (H2) is the lightest of all gases and liquid hydrogen is the lightest of all liquids. It is unique; it has no congeners. It is the first element in the periodic table.

The element hydrogen is prepared commercially by the electrolysis (decomposition of a compound by the use of electric energy) of water. It is used in large quantities in the manufacture of ammonia, the hydrogenation of liquid fats to form solid fats, the production of high temperatures (oxy-hydrogen torch for welding) and the mentioned filling of balloons.

Most of the substances which constitute living matter contain hydrogen (common sugar, starch and other polysaccharides, fats, proteins). It occurs in petroleum and other hydrocarbon mixtures.

A very important hydrocarbon is benzene, which is the basis of many drugs, various chemicals and explosives.

With all of the non-metals hydrogen forms binary compounds (only two elements).

Hydrogen combines vigorously with chlorine, giving hydrogen chloride, a gas of which hydrochloric acid is a solution. It unites with the three most active metals—potassium, sodium, calcium.

Hydrogen acts upon many compounds containing oxygen, removing the latter to form water: The removal of oxygen from a compound by its union with some other substance is called reduction. Reduction is the opposite of oxidation.

The modern usage of the words oxidation and reduction: oxidation is the removal of electrons from an atom or group of .atoms; reduction is the addition of electrons to an atom or a group of atoms. Oxidation, therefore, is de-electronation and reduction is electronation.

An atom, molecule, or ion which takes up electrons is called oxidizing agent and one which liberates electrons is called a reducing agent. The non-metallic elements are strong oxidizing agents, and the metals are strong reducing agents. The compounds of hydrogen with metals and metalloids are called hydrides.

EXERCISES

I. *Answer the following questions*:

1.Why. is hydrogen used in filling balloons ?
2. What is the critical temperature of hydrogen?
3. What are- -the chemical properties of hydrogen?
4. How is hydrogen prepared commercially?

5. Do you know any hydrocarbon which is the basis of many drugs?
6. Does hydrogen unite with active metals? which?
7. What is reduction?
8. What is de-electronation?
9. What is an oxidizing agent? reducing agent?
10. What forms hydrides?

II. *Give the three forms of the following verbs*: to fill, to lead, to know, to give, to unite.

III. *Put the adjectives (or adverbs) into the correct form*:

1. This is ... exercise ... ... (easy).
2. Your paper is ... (good) in the class.
3. This is ... (simple) experiment ... .
4. That is a ... (difficult) problem.
5. It is ... (expensive) apparatus in our country.

IV. *Write 5 sentences with*: ***the former*** and ***the latter***.

V. *Fill in the missing words*:

1. Hydrogen is prepared commercially... the electrolysis , water.
2. It unites ... the three most active metals.
3. Hydrogen acts ... many compounds containing oxygen, removing... …to form water.
4. The removal ... oxygen ... a compound ... its union… some other substance is called ....
5. An atom, molecule, or ion which takes ... electrons is called …

VII. *Suggestions for Composition Exercises ((5-10 sentences each):*

1. The manufacture of ammonia.
2. A visit in large Chemical Works.
3. A day in the life of a chemist.
4. Hydrogen is unique.
5. Elements and the periodic table.

Translate into Ukrainian. Put 10 questions to the text.

OTITIS MEDIA (ACUTE SUPPURATIVE)

Etiology. Acute suppurative inflammation of the middle ear is caused by the introduction of virulent bacteria, usually by way of the Eustachian tube, and occasionally after traumatic rupture of the tympanic membrane or fracture through the middle fossa. The common causative organisms are *Streptococcus haerno-lyticus, Diplococcus pneumoniae* and *Staphylococcus aureus.* Of these, the pneumococcus (Type III) is the most dangerous. This condition is more common during childhood when the Eustachian tube is short, patent, and has only a very slight inclination. It commonly complicates measles, scarlet fever and diphtheria; and otitis media occurring with these diseases is most malignant and destructive. If often follows acute rhinitis, sinusitis and pharyngitis. When the nasal passages are obstructed by any cause, strenuous blowing of the nose facilitates entrance of infected material into the Eustachian tube. Swimming is also a predisposing factor, particularly during acute coryza. Operations on the nose occasionally precipitate infection of the middle ear.

Svmptoms and Signs. Acute otitis media usually begins with pain. This is most severe at night, located deep within the ear but sometimes referred to other parts of the head. It is often constant, but in the early phase of acute invasion the pain may be intermittent. In an occasional case,

there is complete absence of pain, particularly in cases of pneumococcal infection. Fever is usually present in varying degrees. Children show the greatest range of temperature, and it may attain a maximum of 105°F. (40.5°C.) or more during the acute stage. Both the pain and the temperature usually subside when the middle ear is drained either spontaneously or by incision of the drum.

In children, there is frequently some tenderness over the mastoid antrum. It should be remembered that this is an integral part of the middle ear, so that such tenderness early in the course of acute otitis media does not signify the beginning of mastoid disintegration.

The drumhead is red and bulging, and the landmarks are entirely lost. The canal may be foreshortened because of the bulging drum. At times, there are seen changes in the colour of the drumhead in which there are circumscribed areas of apparent whiteness due to accumulation of pus beneath a segment of the drumhead. The drum often ruptures spontaneously, should the patient delay in getting medical attention. The external canal is then filled with pus, removal of which allows the point of peroration to be seen. Immediately following incision or rupture of the drum, the discharge is usually thin and scanty; later, it becomes thicker and more profuse.

Course and Prognosis. If early incision is made and full drain than age established, the condition should be resolved within from 5 days to 3 weeks. Persistence of a purulent discharge for longer weeks denotes that during the early phases of the acute otitis perfect drainage has not been achieved. Lack of fever and pain at the onset of acute otitis media should not give rise to a false sense of security. These may be absent and complications ensue. The serious complications are mastoiditis. meningitis, lateral sinus thrombosis, and septicemia.

Treatment. Rest in bed, light diet, and other supportive and symptomatic measures are indicated. The ear should be examined as soon as possible after the onset of symptoms. Even though spontaneous perforation of the drum may have taken place, it is best to supplement this with incision. Early and adequate incision of the drumhead is imperative. Gentle irrigation of the external canal with boric acid solution, sterile salt solution, or mild bichloride of mercury solutions is performed every few hours, or as often as necessary to keep the canal free of discharge. Sulfonamides are now used extensively and, if given early, may abort the disease and obviate the necessity for incision and drainage. Sulfadiazine is the drug of choice. It may mask the symptoms, and this fact must be borne in mind when making subsequent X-ray films. Penicillin given parenterally also produces gratifying result. About 90 per cent of pyogenic organisms are susceptible to its use. The combined use of sulfadiazine and penicillin may be preferable in many cases. However, incision and drainage must be employed if it appears that the infection has been localized and persists. During convalescence, negative pressure may be applied through the Siegle otoscope to the drum membrane, and spot suction may be used carefully just over the area of incision. Patients must be forbidden to blow the nose strenuously, and irrigation of the nose is contraindicated. After all drainage ceases, the patient must be reexamined. Large adenoid masses and infected tonsils should be removed as early as possible. Inflation of the Eustachian tube should be undertaken in the adult to break up any adhesions.

КОНТРОЛЬНА РОБОТА№44

Translate into Ukrainian

WATER

Water is one of the most important as well as the most plentiful of all chemical substances. It is a main constituent of living matter and of the environment in which we live. The physical properties of water determine the nature of the physical and biological world because they are strikingly different from the properties of other substances.

Physical Properties

Water is without odour or taste, colourless in thin layers. It is bluish -green when we look through a considerable depth of water. The physical properties of water are used to define many physical constants and units. The freezing point of water (saturated with air at 1 atm. pressure) is taken as 0°C., and the boiling point of water at 1 atm.pressure) is taken as 100°C- The unit of mass in the metric system is used so that 1 cm^3 of water at 4°C. (the temperature of maximum density) weighs 1.00000 gram (in the English system:1 cu. ft. of .water weighs approximately 1000 ounces).

The amount of heat required to raise the temperature of one gram of water one degree (the specific heat) is greater than that required for an equal mass of any other common material. The heat capacity of water is thus 1 cal/g. The heat capacity of a substance is sometimes called its specific heat.

With decrease in temperature most substances diminish in (volume and thus increase in density. The unusual property of water is that of having a temperature at which its density is a maximum — this temperature is 4°C. The volume of a sample of water may increase a little with further cooling below this temperature. Water is thus the standard substance used in graduating thermometers. When so used for fixing the temperature of 100°C (the point at which the mercury column of a thermometer stands), the atmospheric pressure must.be normal, that is 760 mm.Melting ice and freezing water have the same temperature —0°C.(the freezing point). The density of ice is slightly over nine-tenths that of water

The temperatures of the boiling water and of steam (a perfectly invisible gas) are found to be identical, 100°C (the boiling point).

Most substances are known in three different states -solid (or crystalline), liquid, and gaseous. All transitions from one state to another take place at some definite temperature (when the pressure is fixed). They are known as transition points. Thus under atmospheric pressure water is converted to ice by reducing the temperature below 0°, and to steam by raising it above 100°. Under a pressure of 100 atmospheres, however, water freezes at -1°, and boils at 330°.

Water is an excellent solvent because it has a remarkable power of dissolving many other substances. Rain is the purest water (natural). As it is formed by condensation of water vapour in the .atmosphere, it contains only oxygen and other gases dissolved from the air, together with a little dust.

Chemical Properties

Water is a very stable substance. When steam is superheated, hardly a trace of decomposition occurs. Even when the temperature reaches 2000°, the maximum decomposition attained is only 1.8 per cent, and reunion occurs as the temperature is lowered.

Water vapour = hydrogen+oxygen

The two arrows in the equation indicate that the action may proceed in either direction. A decomposition which is thus reversible is called dissociation.

We have union of water with oxides (for example, sodium oxide with water forms sodium hydroxide) — it is a characteristic of a class of substances called alkalies or bases. The oxides which, with water, form bases are called basic oxides. Some oxides although they unite with water, give acids (called acidic oxides). For example, sulphur trioxide + water → sulphuric acid.

Many substances unite with water to give compounds called hydrates. Many common

chemicals are in fact such hydrates. Some hydrates are so unstable that the water passes off, even at room temperature, when the hydrate is left in an open vessel. Thus crystals of washing soda (hydrate of sodium carbonate) crumble to powder (effloresce).

Purification of Water

The suspended impurities, including the bacteria, may be removed by filtration. City waters are often filtered through beds of gravel, but this treatment will not remove all bacteria. Most organisms are killed by boiling the unfiltered water for 10 or 15 minutes. Special methods of filtering and chlorination make water safe for drinking purposes (potable water).

Pure water for chemical processes is prepared by distillation. It is the process of converting a liquid to the gaseous state by heating and transforming this vapour back to the liquid state by cooling. Therefore purified water is water obtained by distillation or de-ionization used for pharmaceutical or other purposes requiring a mineral-free water.

EXERCISES

I. *Answer the following questions*:

1. What kind of a substance is water?
2. Why are the properties of water strikingly different from the properties of other substances?
3. What is the unit of energy?
4. What is specific heat ?
5. Why do we say that water is a standard substance?
6. Why is water an excellent solvent?
7. What are the chemical properties of water?
8. What do we get upon union of water with oxides?
9. How are such substances called?
10. What are hydrates?
11. How can water be purified ?
12. Is filtration of city water through beds of gravel a safe method ?
13. How are most organisms in water killed ?
14. Do you know any other method of purifying water ?
15. What process is used to prepare pure water for chemical work ?

II. *Complete the following-sentences using*: ***little, a little, few***, or ***a few****:*

1. Do you drink much water, or ...?
2. The question is difficult, ... students will be able to answer it.
3. The question is very difficult, but I am certain ... students will be able to answer it.
4. Have you much time for experimenting, or…?
5. I have ... minutes for this exercise.
6. We can have a party as there is.... food in the larder.
7. Are there many difficult words in this unit, or ...?
8. ... are quite new.
9. The apparatus is out of order; there is ... we can do.
10. The volume of a sample of water may increase ... with further cooling.

III. *Fill in the missing words*:

1. Water is bluish-green when we look ... a considerable depth of water.
2. The unit ... energy is defined ... terms ... water.
3. ... decrease ... temperature most substances diminish ... volume.
4. ... atmospheric pressure water is converted ... ice by reducing the temperature ... 0°.
5. Some hydrates are so unstable that the water passes … even …room temperature.
6. Crystals of washing soda crumble …powder.
7. City waters are often filtered …beds … gravel.
8. Filtering and chlorination is used to make water safe … drinking purposes.

9.Most organisms are killed … boiling.
10. The physical properties … water are strikingly different … the properties other substances.

IV. *Translate the following sentences*:

1. Вода –це найпоширеніша хімічна сполука.
2. В природі вода –це розчини різних солей і газів.
3. Є багато води морськоі, мінеральноі,річковоі,натуральноІ і чистої.
4. Вода – це універсальний розчинник.

V. *Suggestions for Composition Exercises (5-10 sentences each):*

1)Water-the most important chemical substance.
2)Waters are threatened by Man.
3)A day on the Sahara Desert.
4)A day in the life of a foundry worker.
5)Mineral springs in your country.

Translate into Ukrainian. Put 10 questions to the text.

RACHITIS (RICKETS)

Rachitis is a dietary deficiency disease of infants, due to lack of vitamin D and characterized by enlargement of the epiphyses and softening of the bones. It is almost exclusively a disease of the first 2 years of life. Premature and rapidly growing infants are particularly susceptible. The deposition of calcium phosphate in bones is controlled by vitamin D and depends also on the presence of calcium and phosphorus in proper proportions. Vitamin D is present in animal fats and human milk. The livers of the cod, halibut and other fishes are abundant sources of it. It is also formed in the skin by the influence of ultraviolet radiation on cholesterol in the skin. Viosterol, irradiated ergosterol, is powerfully antirachitic.

Symptoms and Signs. The onset is very insidious. Early manifestations are indefinite, but recognition is important if deformity is to be prevented. Fretfulness, nocturnal restlessness, slight thickening of the wrist and ankle joints due to epiphyseal enlargement, delayed closure of the fontanels, delayed eruption of the teeth, head sweating, diffuse soreness of the body, mild fever, and weakness are the usual symptoms.

The shape of the head becomes square due to the formation of parietal bones (caput quadratum); soft areas may be felt in skull (craniotabes); pot belly with eversion of the lower ribs and depression above them due to the pull of the diaphragm causes Warrison's groove. The enlargement of the anterior rib epiphyses Produces a row of bead-like nodules (rachitic rosary). Softening of the bones of the extremities causes bow-legs with angular deformity (saber shin). The femoral head may be bent forward toward the shaft (coxa vara). Marked lumbar kyphosis is replaced by lumbar lordosis. Marked pelvic and chest deformities may occur. Sometimes excessive production in the hands of subperios teal bone leads tofusiform enlargement of the proximal middle phalanges ("string of pearls" deformity). Fractures of the long bones are common, generally of the green-stick variety. There is an increased susceptibility to respiratory tract infections. Tetany may occur.

Diagnosis. The well-developed case is easily recognized, to detect the disease early, the thorax should be palpated from time to time along the line of junction of the ribs and their cartilages for enlargement. An X-ray film of a wrist is indicated in doubtful cases. This, in a rickets sufferer, will show fraying of the normally sharp termination of the shafts of the lower ends of the radius and ulna cupping of the line of termination spreading of the end of the bone, and sometimes cortical spurs at the lateral margins. The whole bone is less dense than a normal one. On this account an X-ray of

the wrist is generally looked upon as a valuable criterion when making an early diagnosis.

Prognosis. The disease is rarely fatal, but intercurrent infections may cause death. Spasm of the larynx and convulsions are occasionally fatal). Deficient chest expansion may result. Rachitic deformity of the pelvis of females is a serious handicap during parturition. Adequate treatment instituted early arrests the disease and restores the body practically to normal.

Treatment. There should be an adequate milk intake to ensure sufficient available calcium, and phosphorus in proper proportion. A vitamin D concentrate in doses of 4,000 to 10,000 international units per day should be given. Cod-liver oil is a form commonly used, 3 doses a day being given, the amount depending upon the strength of the preparation used. The more concentrated viosterol (irradiated ergosterol) may be used instead in doses of 20 to 50 drops a day. Different brands of fish-liver oil vary in potency.

Some few cases of rickets are resistant to therapy, and failure to improve should lead to further examination to be sure that a correct diagnosis has been made, and this should be follow by an increase in dosage of vitamin D until improvement does occur. Excessive doses of vitamin D may, apparently, cause serious toxic effects, and the blood calcium should be carefully followed if excess dosage is used. Any abnormal increase in blood calcium indicates the necessity for immediate withdrawal of vitamin D. Exposure to sunlight for 2 hours a day, or to ultra-violet rays for gradually increasing periods of 1 to 20 minutes is another efficacious form of therapy. Care should be taken to prevent deformity; the child should not be allowed to walk unless supporting splints are applied to the legs. Orthopaedic treatment may be required for deformities that have developed. The efficacy of treatment can be followed by means of serial roentgenograms of the wrist, which should show new deposits of lime salts in the zone between bone and cartilage, and a reappearance of epiphyseal line; restitution to a normal appearance may require many months.

Prevention. Rickets is so much less common in breast-fed infants than in those fed artificially that the insistence upon breast/feeding for the first nine months may justly be regarded as a sound prophylactic measure. The disease most commonly occurs in children who have been reared on the sweetened form of condensed milk or have been given a diet containing cereal and unconverted starch from an early age. Foods containing starch should not be given to infants under six months of age. But it is not only at this age that starchy foods may be harmful. Towards the end of the first year, when the diet is expanding from milk to more solid food, too much cereal food such as bread, potato and biscuit is apt to be given to the exclusion of milk, butter, eggs, and green vegetables; such a diet is conducive to rickets.

Except in the warm summer months, it is a good rule to add vitamin D to the diet of infants and children up to at least the end of the second year. A teaspoonful of cod-liver oil twice a day will be sufficient, or alternatively ten drops of halibut-liver oil once a day will serve instead.

A great deal may be accomplished by keeping the infant out-of-doors as much as possible. When the weather permits, he should be taken out in the morning and afternoon, and in the summer months should spend most of the day out-of-doors. It has been shown that even the reflected sunlight from clouds has a beneficial effect in preventing rickets.

Prophylaxis consists also in supplying the pregnant mother with an adequate amount of calcium and vitamin D.

There is evidence that the continued use of excessively large doses of vitamin D produces a cumulative detrimental effect (hypervitaminosis D). The symptoms are: loss of weight, cachexia and calcification of many tissues with hypercalcemia and retention of nitrogenous products in the blood associated with severe renal lesions. Early symptoms of overdosage are: nausea, headache, anorexia, diarrhoea, frequent urination with nycturia, and lassitude. Use of the vitamin should in such cases be stopped, and everything which tends to increase the blood calcium prohibited. The increased likelihood of rickets developing in infants born prematurely, and also in those who are recovering from any wasting condition, must be particularly born in mind so that preventive measures may be undertaken as soon as possible.

КОНТРОЛЬНА РОБОТА №45

Translate into Ukrainian

NITROGEN. THE ATMOSPHERE

The most active component of the atmosphere is oxygen The other chief component is nitrogen. The free nitrogen forms nearly four-fifths of the bulk of atmospheric air. Much nitrogen is found in nature in combination. For example-potassium nitrate is found in the soil by the action of bacteria upon organic matter. Sodium nitrate is obtained from an immense deposit in Peru and Chile. Nitrogen is an essential constituent of an important class of organic substances called proteins.

Physical Properties

Nitrogen is a colourless, tasteless and odourless gas. Its density is indicated in the formula N2 (22.4 liters weigh 28 g). It is very little soluble in water. When liquefied it boils at —194° and freezes at —214°.

Chemical Properties

Nitrogen is chemically a rather indifferent gas. It unites with a very few elements, notably some of the most active metals (calcium and magnesium).

The compounds with oxygen such as nitric oxide and nitric acid, and with hydrogen such as ammonia are of immense commercial value, but not being very stable, they are formed only in traces by direct union of the elements.

Sodium nitrate is used as a fertilizer, and for conversion into nitric acid and other nitrates. Potassium nitrate (saltpetre) is used in pickling meat (ham, beef), in medicine, and in the manufacture of gunpowder. The nitrates of all metals are soluble in water.

The Atmosphere

The atmosphere is the mixture of gases and vapours that surround the earth and forms part of it. Atmosphere consists chiefly of oxygen and nitrogen. The oxygen enables human beings and other animals to live and breathe and makes the earth the only planet of the solar system that supports higher life.

The atmosphere also contains small amounts of carbon dioxide (the product of the respiration of men and animals that enables plants to live), argon, hydrogen, helium, neon, krypton, xenon, ozone (the product of electrical discharges), water vapour (in the form of clouds) and other substances, particularly organic and inorganic particles (such as dust) and gaseous impurities (such as ammonia and carbonic acid). Beyond the earth's atmosphere is the vast emptiness of space. But there is no sharp division where the atmosphere ends. I

The composition of the air is remarkably uniform and constant. The uniformity is due to constant mixing by the winds. The steadiness of the composition from year to year is due to the fact that, although decay and combustion continually remove oxygen and add carbon dioxide, vegetation as continually consumes the latter and restores the former.

If one or more human beings remain in an enclosed space (a room, an auditorium), the air is subjected to chemical and physical changes. It becomes necessary to provide proper air conditions and this is the aim of ventilation. This means clean air at proper temperature and humidity, in moderate motion and free from odours and noxious impurities. Good air conditions may be attained by window ventilation or by the use of fans

The humidity of air is expressed in terms of relative humidity (the percentage of moisture contained in the air by comparison to the maximum which air can hold at the same temperature). The most desirable relative humidity at favourable temperatures and with moderate air movement is about 50 per cent.

The air of large cities is becoming contaminated with particles of dirt and soot, smoke and traffic odours (automobile exhausts) especially about factories, garages, and in heavy traffic. Air pollution is a serious problem because the danger limit is very near.

EXERCISES

I. *Answer the following questions*:

1. What is the nitrogen content of the atmospheric air?
2. Is there any nitrogen in nature?
3. In what organic substances is nitrogen an essential constituent?
4. What are the physical properties of nitrogen?
5. Which compounds of nitrogen are of immense commercial value?
6. What is atmosphere?
7. Do you know of any other planet (than the earth) of the solar system that supports higher life?
8. How does it happen that the composition of the air is uniform and constant?
9. What is the aim of ventilation?
10. How do we express the humidity of-air?

II. *Fill in the missing words*:

1. Nitrogen is found ... nature ... combination.
2. When liquefied it boils ... — 194° and freezes ... —14°.
3. The compounds ... oxygen are formed only ... traces ... direct union... the elements.
4. Sodium nitrate is used ... conversion ... nitric acid and other nitrates.
5. The uniformity ... the composition of the air is due ... constant mixing ... the winds.
6. Ventilation means clean air ... proper temperature and humidity.
7. We can improve air conditions ...window ventilation or ... the use of fans.
8. Carbon dioxide as the product ... the respiration ... men and animals enables plants ... live.
9. Potassium nitrate is found ... the soil... the action ... bacteria ... organic matter.
10. The nitrates ... all metals are soluble ... water.

IV. *Suggestions for Composition Exercises (5-10 sentences each):*

1. Other planets ...
2. Space travelling.
3. Astronauts and their equipment.
4. Air conditioning.
5. Industrial districts and man.
6. A windy day.

Translate into Ukrainian. Put 10 questions to the text.

MENINGITIS
(Cerebrospinalis Epidemica)

This is an acute meningitis occurring sporadically or epidemically, characterized by an acute febrile course with severe systemic symptoms, manifestations of meningeal involvement, specific fluid findings, and a high mortality rate.

Etiology. This infectious disease, with its remarkable predilection for the enveloping tissues of the nervous system, is caused by the meningococcus, *Neisseria intracellularis meningitidis.* It appears in both epidemic and endemic form, the former most often in the winter and spring. Children and young adults are most susceptible, but in severe epidemics no age group is spared The specific organism is sometimes found in the nasopharynx of healthly persons, and it is extremely probable that the disease is spread by such carriers. The previous state of the victim's health is of little importance and significance, the strong and active being just as susceptible as the weak and "run-down" individual.

Pathological Considerations. There is marked purulent exudation, involving the pia-

arachnoid over the entire surface of the brain and spinal cord, as well as the ventricles themselves. The process frequently involves the superficial layers of the parenchyma, and very occasionally small abscesses are seen. The exudative cells are predominantly polymorphonuclear leukocytes, within which ingested *Meningococci* are often found. The inflammatory process may involve the eyeball as well, probably by means of extension along the optic nerves, and result in a severe panophthalmitis. The auditory nerve may be involved, with resulting deafness. At times a peculiarly virulent form appears in which the overwhelming meningococcemia produces large coalescing purpuric blotches; this form usually has a fatal outcome within 6 to 12 hours after onset. Extensive internal haemorrhages are found, particularly in the medullary portions of the adrenal glands. It is this last condition that produces the abrupt collapse and death. At times in this type, meningeal signs are entirely absent. This form of meningococcal infection is known as the Waterhouse-Friderichsen syndrome.

Symptoms and Signs. In cerebrospinal meningitis the symptoms are quite apt to begin acutely. At times, the onset may be fulminating with high fever, stupor and coma, and few signs of meningeal irritation. In these cases, the blood culture is usually positive. Generally, however, there is headache and restlessness for a day or two, and often a mild upper respiratory infection. The headache then becomes severe, the temperature; usually rises, vomiting and photophobia are common, and definite rigidity of the neck is almost constant. In children, convulsions are frequently seen, especially at the onset of the disease. Both Kernig's and Brudzinski's signs are usually present. The former is the inability passively to extend the leg when the patient lies on his back with the thigh flexed at a right angle with the body; the latter consists in flexion of the knee when an attempt is made to flex the head on the chest (neck sign), or flexion of one knee when the other is flexed on the abdomen (leg sign). Petechiae and purpuric spots in the skin may be seen during the early stages, as well as a positive blood culture. Deep and superficial reflexes are diminished or lost. Abnormal reflexes are seldom seen. There is generally a leukocytosis over 20,000 with an increase in the percentage of polymorphonuclear neutrophils. The spinal fluid is under markedly increased pressure; there is a great increase in polymorphonuclear leukocytes, usually over 1,000 per c.mm.; the fluid is cloudy, the protein is increased, and the sugar and chlorides are decreased. Most important of all, meningococci are usually easy to demonstrate in the fluid, or may be cultured within a very short time. As mentioned before, ophthalmitis, and various cranial nerve disturbances are sometimes seen as complications, but these occur in a rather small percentage of cases.

Course and Prognosis. In untreated cases, the mortality rate is difficult to determine accurately, but it is probably 60 to 70 per cent. In these cases, coma becomes progressively deeper, incontinence sets in, the fever is usually high, weakness and emaciation are marked, and death usually occurs within 10 days. The introduction of type-specific sera reduced the mortality to about 20 per cent. Later, with the use of various sulfonamide preparations the mortality was further lowered to 2 or 3 per cent. Penicillin is as effective as the sulfonamides but has not produced any further appreciable reduction in mortality. The meningococcus is not susceptible to streptomycin.

Certain cases show a tendency to recur after apparent cure. This probably depends upon the liberation of organisms that have become caught in loculated cerebrospinal fluid collections secondary to the formation of meningeal adhesions. Sequelae are fairly common. Children frequently develop a low-grade chronic hydrocephalus. Chronic headaches, visual disturbances, and deafness are seen, as well as mental and emotional disorders. Focal paralysis such as hemiplegia and monoplegia are rare.

Treatment. Whenever meningitis is suspected and cloud spinal fluid obtained, the case should be treated as one of meningococcal meningitis until proved otherwise. The treatment is symptomatic, chemotherapeutic and specific. Specific treatment is fast being replaced by the chemotherapeutic except in severe, fulminating cases with septicemia, when both treatments are employed. Symptomatic treatment consists in the usual regimen of competent nursing, rest and quiet, sedatives, ice bags and a light and nutritious diet. In cases of shock due to toxemia blood transfusion and plasma infusion should be used.

Chemotherapy consists in the use of sulfadiazine in the usual dosage without spinal drainage except for diagnostic purposes. The drug is preferably given intravenously as sodium sulfadiazine. Since the body fluids should be restored as rapidly as possible, the drug may be given in a single 1,000 cc. dose of isotonic solution of sodium chloride.

Penicillin is of about the same value. Intrathecal administration of penicillin has many proponents, but there are two good reasons against its use in this manner. The "meningitic barrier", originally believed to prevent the spinal fluid penicillin levels from equalling the serum penicillin levels, has been found to be broken down by any process which produces a meningeal irritation or hyperemia. Since any meningitis does this, an adequate amount of penicillin will find its way into the spinal fluid if sufficient has been given. Secondly, it has been shown that intrathecal penicillin may produce arachnoidal adhesions, convulsions, and severe reactions with anaesthesias and paraesthesias. In those cases in which specific therapy is also advisable, polyvalent antimeningococcal serum is given intravenously every 24 hours, in doses of 30 to 90 cc., until the patient is out of danger. The patient should be first tested for sensitivity; and the serum should be tested to determine whether it agglutinates the organism present in the spinal fluid.

Meningococcal antitoxin may also, preceded by sensitivity tests, be given intravenously in 10 per cent glucose solution in doses ranging from 25,000 units for adults. This form of therapy, has, however, fallen into almost complete disuse since the advent of chemotherapy and penicillin. Should a unilateral meningococcal ophtalmia appear, enucleation of that eye should be seriously considered, since sympathetic ophtalmia is quite frequent. If spinal subarachnoid block should supervene, combined lumbar and cisternal puncture should be perfomed, and the block broken down by washing upward from below the spinal subarachnoid space with warm serum or normal saline solution in doses ranging from 25,000 units for infants to 150,000 units for adults. This form of therapy, has, however, fallen into almost complete disuse since the advent of chemotherapy and penicillin. Should a unilateral meningococcal ophtalmia appear, enucleation of that eye should be seriously considered, since sympathetic ophtalmia is quite frequent. If spinal subarachnoid block should supervene, combined lumbar and cisternal puncture should be perfomed, and the block broken down by washing upward from the spinal subarachnoid space with warm serum or normal saline solution.

КОНТРОЛЬНА РОБОТА№46

Translate into Ukrainian

Properties of water

Water is without odour or taste, colourless in thin layers. It is bluish -green when we look through a considerable depth of water. The physical properties of water are used to define many physical constants and units. The freezing point of water (saturated with air at 1 atm. pressure) is taken as 0°C., and the boiling point of water at 1 atm.pressure) is taken as 100°C- The unit of mass in the metric system is used so that 1 cm^3 of water at 4°C. (the temperature of maximum density) weighs 1.00000 gram (in the English system:1 cu. ft. of .water weighs approximately 1000 ounces). Water is one of the most important as well as the most plentiful of all chemical substances. It is a main constituent of living matter and of the environment in which we live. The physical properties of water determine the nature of the physical and biological world because they are strikingly different from the properties of other substances.

The amount of heat required to raise the temperature of one gram of water one degree (the specific heat) is greater than that required for an equal mass of any other common material. The heat capacity of water is thus 1 cal/g. The heat capacity of a substance is sometimes called its specific heat.

With decrease in temperature most substances diminish in (volume and thus increase in density. The unusual property of water is that of having a temperature at which its density is a maximum — this temperature is 4°C. The volume of a sample of water may increase a little with further cooling below this temperature. Water is thus the standard substance used in graduating thermometers. When so used for fixing the temperature of 100°C (the point at which the mercury column of a thermometer stands), the atmospheric pressure must.be normal, that is 760 mm.Melting ice and freezing water have the same temperature —0°C.(the freezing point). The density of ice is slightly over nine-tenths that of water

The temperatures of the boiling water and of steam (a perfectly invisible gas) are found to be identical, 100°C (the boiling point).

Most substances are known in three different states -solid (or crystalline), liquid, and gaseous. All transitions from one state to another take place at some definite temperature (when the pressure is fixed). They are known as transition points. Thus under atmospheric pressure water is converted to ice by reducing the temperature below 0°, and to steam by raising it above 100°. Under a pressure of 100 atmospheres, however, water freezes at -1°, and boils at 330°.

Water is an excellent solvent because it has a remarkable power of dissolving many other substances. Rain is the purest water (natural). As it is formed by condensation of water vapour in the .atmosphere, it contains only oxygen and other gases dissolved from the air, together with a little dust.

Water is a very stable substance. When steam is superheated, hardly a trace of decomposition occurs. Even when the temperature reaches 2000°, the maximum decomposition attained is only 1.8 per cent, and reunion occurs as the temperature is lowered.

Water vapour = hydrogen+oxygen

The two arrows in the equation indicate that the action may proceed in either direction. A decomposition which is thus reversible is called dissociation.

We have union of water with oxides (for example, sodium oxide with water forms sodium hydroxide) — it is a characteristic of a class of substances called alkalies or bases. The oxides which, with water, form bases are called basic oxides. Some oxides although they unite with water, give acids (called acidic oxides). For example, sulphur trioxide + water → sulphuric acid.

Many substances unite with water to give compounds called hydrates. Many common chemicals are in fact such hydrates. Some hydrates are so unstable that the water passes off, even at room temperature, when the hydrate is left in an open vessel. Thus crystals of washing soda (hydrate of sodium carbonate) crumble to powder (effloresce*).*

The suspended impurities, including the bacteria, may be removed by filtration. City waters are often filtered through beds of gravel, but this treatment will not remove all bacteria. Most organisms are killed by boiling the unfiltered water for 10 or 15 minutes. Special methods of filtering and chlorination make water safe for drinking purposes (potable water).

Pure water for chemical processes is prepared by distillation. It is the process of converting a liquid to the gaseous state by heating and transforming this vapour back to the liquid state by cooling. Therefore purified water is water obtained by distillation or de-ionization used for pharmaceutical or other purposes requiring a mineral-free water.

EXERCISES

I. *Answer the following questions*:

1. What kind of a substance is water?
2. Why are the properties of water strikingly different from the properties of other substances?
3. What is the unit of energy?
4. What is specific heat ?
5. Why do we say that water is a standard substance?
6. Why is water an excellent solvent?
7. What are the chemical properties of water?
8. What do we get upon union of water with oxides?
9. How are such substances called?
10. What are hydrates?
11. How can water be purified ?
12. Is filtration of city water through beds of gravel a safe method ?
13. How are most organisms in water killed ?
14. Do you know any other method of purifying water ?
15. What process is used to prepare pure water for chemical work ?

II. *Complete the following-sentences using*: ***little, a little, few****,* or ***a few****:*

1. Do you drink much water, or ...?
2. The question is difficult, ... students will be able to answer it.
3. The question is very difficult, but I am certain ... students will be able to answer it.
4. Have you much time for experimenting, or…?
5. I have ... minutes for this exercise.
6. We can have a party as there is.... food in the larder.
7. Are there many difficult words in this unit, or ...?
8. ... are quite new.
9. The apparatus is out of order; there is ... we can do.
10. The volume of a sample of water may increase ... with further cooling.

III. *Fill in the missing words*:

1. Water is bluish-green when we look ... a considerable depth of water.
2. The unit ... energy is defined ... terms ... water.
3. ... decrease ... temperature most substances diminish ... volume.
4. ... atmospheric pressure water is converted ... ice by reducing the temperature ... 0°.
5. Some hydrates are so unstable that the water passes … even …room temperature.

6.Crystals of washing soda crumble …powder.
7.City waters are often filtered …beds … gravel.
8.Filtering and chlorination is used to make water safe … drinking purposes.
9.Most organisms are killed … boiling.
10. The physical properties … water are strikingly different … the properties other substances.

IV. *Translate the following sentences*:

1. Всі живі істоти складаються з води: риби — на 75%, тварини — на 75%, картопля — на 76%, медузи — на 99%, помідори — на 96%, яблука — на 85%. Навіть людина, і та, складається з води: у новонародженого в тілі міститься 86%, у старої ж людини — не більше 50%....
2. Загальні запаси води, яку можна використовувати для пиття всього 3% із загальної кількості водних ресурсів....
3. Якщо наш організм втратить 2% води від своєї маси, то виникне відчуття сильної спраги. Якщо рівень втраченої води дійде до 10%, то у людини починаються галюцинації. А вже при втраті 12%рідини, людина не зможе обійтися без допомоги лікаря. При втраті 20% рідини людина помирає.

V. *Suggestions for Composition Exercises (5-10 sentences each):*

1) Conserving water.
2) A person can live about a month without food, but only about a week without water.
3) The Sahara Desert.
4) The impacts of water compositions on sensory properties of foods and beverages.
5) How to stop wasting water.

Translate into Ukrainian. Put 10 questions to the text.

CHOREA
(Rheumatic Chorea; Sydenham's Chorea; St. Vitus's Dance)

Chorea is a nervous disorder characterized by:
1) involuntary movements, 2) incoordination of voluntary movements, 3) emotional disturbances.

Etiology. Chorea is rarely encountered in children under five years. The incidence rises rapidly after the fifth year, reaching its maximum at about the tenth year, and becomes rare after puberty. Girls are more often affected than boys. Children who are alert and intelligent are much more likely to be affected than those who are dull and placid. There is often a history of some shock or fright at the beginning of an attack.

Symptoms. The onset is usually gradual. Often, the first symptom to be noticed is that the child continually drops things and becomes fidgety, makes faces, and is easily provoked to tears, or may become dull and unable to concentrate. The movements are the most noticeable feature. These vary very much in degree, and are typically haphazard. At one moment the mouth is twisted or the eyebrows raised, a moment later a shoulder is shrugged, a hand jerked or a foot shuffled; in fact, it is impossible to foretell what movement will appear next. The tongue may make clucking noises, and sighing — which is unusual in childhood — occurs because of incoordination of respiration. The excursions of the diaphragm are often excessive. The speech becomes hesitating, and words may be clipped short, or spoken in a whisper, or uttered explosively. Rapid alternations between meaningless

laughing and crying are common.

When the hands are outstretched, it is characteristic for the wrist to be flexed and for the fingers to be hyperextended, while the thumb makes constant dipping movements. The tendon reflexes are variable, but in the most severe cases they are generally lost. The knee-jerk, when present, may be so altered that one tap to the patella tendon is followed by a series of jerks, until the leg is fully extended.
The movements are often more marked on one side of the body than on the other. The movements cease during sleep, but when they are violent the child may have great difficulty in getting any rest, and there is a real danger of acute exhaustion. Speech may be so severely affected as to be completely lost, and for the space of a month or two the child may be dumb, but dumbness is never permanent, the voice returning when the choreic movements cease. In rare instances, the child becomes more and more excited until acute mania develops — the child will tear up anything within reach, shout and abuse everybody. It may be six or more months before the behaviour settles down and a normal mentality is regained.

Lastly, there is a limp or paralytic type of chorea. This is the most severe variety, and is invariably accompanied by gross cardiac rheumatism. The muscles are toneless, and if the limbs are lifted from the bed and released they flop back helplessly. Tendon reflexes are absent. Frequent purposeless movements of the small joints or occasional twitches of the face can be made out — the more coarse choreic movements are abolished. If the child can survive the carditis, then recovery from the chorea can be confidently expected.

In any child with chorea, the state of the heart is of the greatest importance. A systolic bruit at the apex is the most common finding, and is often accompanied by some dilatation of the heart. In at least a third of these cases, the evidence of involvement of the heart clears up during convalescence, and it might be said that the bruit in such cases was functional rather than due to rheumatic inflammation, but it is well known that rheumatic carditis is capable of complete recovery, and, if chorea be accepted as a rheumatic manifestation, it is certainly wiser to treat these bruits with all the respect due to rheumatic carditis. At other times, the occurrence of a diastolic as well as a systolic murmur, or the presence of subcutaneous nodules, or the occasional development of pericarditis, leaves no doubt about the presence of heart disease. On the other hand, there may be nothing to indicate active infection of the heart, and when that is the case the heart action is often noticeably slow and deliberate, the pulse rate dropping to about 60 per minute.

Diagnosis. Chorea may, in childhood, be regarded almost without exception as rheumatic, but typical choreic movements occasionally arise in the course of other diseases of the brain (encephalitis lethargica, cerebral tumour). The most common condition with which chorea is confused is habit spasm. A typical habit spasm consists of one or perhaps two movements which are continually repeated, for example, a child may frequently blink his eyes or purse his mouth; the movements of chorea, on the other hand, are widespread and repetitive.

Course and Prognosis. The prognosis of uncomplicated chorea is good, complete recovery being the rule. In exceptional cases chorea is fatal from sheer exhaustion, but almost all such case' come about owing to coincident carditis.
Like all rheumatic conditions, chorea is very likely to relapse and a child may have as many as five or six attacks. Under treatment, the movements disappear, as a rule, in a month or six weeks.

Treatment. Rest in bed must be absolute; it will not do simply for the child to rest in bed for so many hours a day, spending the remaining hours up and about. He should be hand-fed by a nurse and kept flat. When the movements have subsided, and when the child is no longer agitated by trying to perform any simple action — then the child should be allowed to begin to do things for himself and to sit up in bed. This stage is generally reached after the third or fourth week. Massage should also be given as a preliminary to getting up. Special treatment is necessary when the movements are so violent that the child is in danger of injuring himself. The cot sides should be well padded, and when

restlessness makes it difficult for him to get to sleep, a warm sponging may do much to promote rest, or in more severe cases a hot pack may be found efficacious in soothing him.

To give a hot pack, wrap the child in a blanket wrung out of warm water at 105°F. (40.5°C) with an outer dry blanket. The child should lie in the pack for half-an-hour, and then be dried and have a warm night suit put on.

Drugs. There is no specific remedy for chorea. Bearing in mind that chorea tends to recover simply with rest in bed, drugs should never be pushed to dangerous limits. Sedatives may, in order to prevent exhaustion, be used when the movements are severe. Chloral, chloretone, phenazone and bromides are the most useful for this purpose. Chloral (gr. 5 per diem) is useful in promoting sleep. Chloretone (3 to 5 grs.) may be given three times a day. In mild cases, phenazone (gr. 5) combined with an equal amount of bromide may help the child to settle off at night.

Sodium salicylate and aspirin have, in view of their known value in relieving the pain of acute rheumatism, been given an extensive trial in the treatment of chorea, but it cannot be said that they diminish the duration of an attack, although they may do something to lessen the likelihood of other rheumatic complications.

No drug used in chorea has been shown capable of preventing that most important complication of all — carditis.

Recent reports suggest very favourable and lasting results after ACTH therapy just as in the rheumatic heart disease. Some authors claim sleep therapy to be of great value in treating chorea.

КОНТРОЛЬНА РОБОТА №47

Translate into Ukrainian

PROPERTIES OF SALTS

The salts are the largest class of compounds in nature. Binary salts are those of the hydro-acids; they contain two elements, in naming them the suffix **ide** is in common use. Thus sodium chloride is a binary salt, one of the salts of hydrochloric acid. Salts are the compounds formed when metals replace the hydrogen in acids. Zinc replaces the hydrogen in dilute hydrochloric acid, forming zinc chloride, which is a salt. The very same radicals that are combined in acids with hydrogen, appear also in salts.

Ternary salts contain three elements. Here the suffix **ate** is used to denote the salt of an oxyacid with an **ic** ending. The suffix **ite** is used when the acid has an **ous** ending. Thus sodium sulphate (Na_2S0_4 is a salt of sulphuric acid (H_2S0_4) but sodium sulphite Na2SO4) is a salt of sulphurous acid (H_2S0_3).

The most important of the nitrate salts is sodium nitrate. Sodium nitrate is prepared commercially by the reaction of nitric acid and sodium carbonate. Another member of this group is silver nitrate, used as a cauterizing agent and in the preparation of germicidal solutions.

Sodium chloride or common salt (table salt) is the most abundant chloride occuring in nature.

Large deposits of this substance are found in various parts of the world. There are different methods of recovering and purifying it. Usually borings are made and water is forced down, forming brine that is pumped to the surface and afterwards evaporated for the crystalline salt. Salt has the property of absorbing moisture (deliquescence).

It is an indispensible article of animal food and it is used in making sodium carbonate, hydrochloric acid and chlorine. It is also used in freezing and preserving foods and exterminating weeds.

There is a group of salts of the halogen family (halides). Chlorine belongs to the halogen family along with fluorine bromide, and iodine.

The sulphates are salts of sulphuric acid. The most abundant sulphate in nature is gypsum. Its principal use is in making plaster of Paris and in the building industry.

Sulphuric acid forms with the trivalent metals complicated salts called alums (double salts). Potassium alum is a typical representative. It consists of potassium sulphate and aluminium sulphate.

The carbonates are salts of carbonic acid, a weak and quite unstable acid.

In this group of salts best known and most widely used is sodium carbonate or washing soda. It is important in the manufacture of glass, soap and sodium hydroxide and in softening water.

Sodium bicarbonate or baking soda. It is used in baking powders and medicines. Baking powder is a mixture of the bicarbonate and a weak acid, usually cream of tartar. Dough is caused to rise by the liberation of bubbles of carbon dioxide through the reaction of the bicarbonate and acid when water and heat are added.

There are many other groups of salts such as the phosphates-used as a fertilizer; the bromides, especially silver bromide is important in photography, other bromides have medicinal properties. Then there are the silicates indispensible in the manufacture of glass and cement. The borates are also among the many groups of salts.

Since there are a great many possible combinations of metals with acid radicals, the number of salts is very large. The majority of inorganic compounds belong to this class. Many of them are important substances for their usefulness in the home, in the human body, in the industries, and for medicinal purposes.

An acid and a base will always react to form water and a salt. And that is the process of making a solution neutral. The final products of complete neutralization possess no acid or basic properties.

Acids, bases, and salts are the only substances which form solutions in water that are able to conduct an electric current. As a group they are electrolytes. They are the only substances the molecules of which seem to be resolved into independent particles when they are in solution in water. This breaking up of molecules into independent particles when in solution is called dissociation or electrolytic dissociation, since the particles thus formed have electrical charges. The fact that these particles (ions) are electrically charged, as well as the nature and the amount of the charges they carry is explained on the basis of the electron constitution of matter. The positively charged ions are those each of which has lost one or more electrons which have been taken up by the other kind of ions in the solution and in this way these ions receive an equal number of negative charges. The amount of the charges carried by the ions is directly proportional to the number of electrons gained or lost, and hence is the same as the valence of the element or radical.

X-ray pictures of crystals have shown that most crystalline salts do not exist in the form of electrically neutral molecules but that they are composed of ions packed close together in an orderly arrangement. The ions are paired so, that in the orderly heap there are equal positive and negative charges and the substance as a whole is electrically neutral. The net result when the salt is dissolved in water is the same, because the strong electrical attraction that holds the ions together in the crystal is weakened by dispersion in the solvent and the ions are free to move about as independent particles. The positive and negative particles sometimes collide or they get so close together that electrical attraction asserts itself and they behave as one particle. This explains why salts, and other electrolytes, seem never to be completely dissociated into ions.

The more dilute the solution (the greater the proportion of water to salt) the less chance for attractive forces to hinder the free movement of ions, and the more complete will be the effective degree of ionization. Salts, as a rule, show a rather high degree of ionization (mercuric chloride is an exception).

EXERCISES

I. *Read the following sentences and make questions*:

I. The salts are the largest class of compounds in nature.
2. Salts are the compounds when metals replace the hydrogen in acids.
3. The suffix *ite* is used when the acid has an ous ending.
4. The most important of the nitrate salts is sodium nitrate.
5. Sodium chloride or common salt is the most abundant chloride occurring in nature.
6. Salt has the property of absorbing moisture.
7. Sodium chloride is an indispensable article of animal food.
8. Chlorine belongs to a group of salts of the halogen family.
9. The sulphates are salts of sulphuric acid.
10. Sodium bicarbonate is used in baking powders and medicines.

II. *Fill in the missing words*:

1. The carbonates are salts ... carbonic acid.
2. Sodium carbonate is important ... the manufacture ... glass, soap.
3. Binary salts: ... naming them the suffix *ide* is ... common use.
4. Sodium nitrate is prepared commercially ... the reaction ... nitric acid and sodium carbonate.
5. Sodium chloride is used ... freezing and preserving food.
6. Chlorine belongs ... the halogen family along ... fluorine, bromine, and iodine.

7. Sulphuric acid forms ... the trivalent metals double salts.
8. Dough rises ... the liberation ... bubbles ... carbon dioxide when we use baking powder.
9. The liberation of bubbles takes place ... the reaction ... the bicarbonate and
acid when heat and water are added.
10. The silicates are indispensable ... the manufacture ... glass and cement.
III. *Complete the following sentences*:
1. Binary salts are those of the h---o-a---s.
2. In naming binary salts the suffix — is in common use.
3. Sodium nitrate is prepared commercially by the reaction of n----c a--d and s——m c-—
—e.
4. Silver nitrate is used as c---------g a---t and in the preparation of g---l s---s.
5. Another name for sodium chloride is c----n s--t or t---e s--t.
6. Salt has the property of absorbing moisture or d------ —— -e.
7. The principal use of gypsum is in making p-----r of P---S and in building industry.
8. A—-s or d----e s---s are complicated salts formed by sulphuric acid and the trvalent metals.
9. Sodium carbonate is also known as w-----g s--a.
10. Sodium bicarbonate is known as b----g s--a; it is a mixture of the b---------e
and a weak acid, usually c---m of t----r .
V. *Suggestions for Composition Exercises (5-10 sentences each):*
1. Salt is essential to life.
2. Uses, effects and sources of salts.
3. The economical importance of sodium chloride.
4. Salt: good or bad?
5. Salt used to be more valuable than gold.

Translate into Ukrainian. Put 10 questions to the text.

RADIANT ENERGY IN OPHTHALMOLOGY

The eye may be subjected to injury from radiant energy in addition to the mechanical, chemical, and thermal trauma. The resulting ocular damage depends on the wave length of the radiaion, the amount absorbed by the tissues, and the tissue affected. Ocular lesions can be produced by radiant energy of almost any length. The tissue reactions to these radiations are very complex and, in spite of extensive study, still are incompletely understood.

Ordinary visible light radiations in moderate amounts may be unpleasant to the eye but cause no permanent damage. Photophobia and discomfort are particularly noticeable in fatigued or inflamed eyes. The unpleasant sensations of glare and flicker are extremely difficult to interpret. Painful photophobia is probably due to a strong miosis and accommodative spasms. Injury may result from more prolonged exposure, such as eclipse blindness, and severe retinal damage may occur. The burn is due to the concentration of the radiant energy in a very small area, producing local heating and consequent necrosis. Advantage is taken of this effect in therapeutic photocoagulation. The heating effect occurs in the pigment epithelium, which absorbs light and converts it to heat. Necrosis occurs in the pigment cells and secondary effects develop in the adjacent rods and cones. Wave length shorter than those which are visible are absorbed by the lens and do not reach the retina. Therefore, unless the eye is' aphakic the retina is not injured by ultraviolet light.

The development of the photocoagulator (by Meyer-Schwickerath) has led to a method of producing retinal burns identical to those seen in solar retinopathy and atomic flash burns. The light produced by the photocoagulator is so concentrated and intense that it is absorbed by the retinal pigment epithelium, converted to heat, and produces its effects secondarily on the outer retina. The

size of the retinal burn produced by this instrument usually varies from 0.5 degree to 6 degrees, though much larger areas of necrosis may be produced in treating neoplasms.

Radiation Injury. Ionizing radiation includes the electromagnetic rays (X-rays and gamma rays) and particulate beams (beta particles and neutrons). Only the rays with sufficient energy to penetrate the retina in threshold dosage produce changes in this layer. Early reactions are noted in hours to weeks (depending on the dosage) and resemble those of any destructive irritant.

There is hyperemia, edema, swelling, and vacuolation of the cells; later there is death or proliferation, depending on the dose and on the susceptibility of individual cell types. Several years after exposure, hard white exudates and new vessel formation may occur and often are complicated by intraocular hemorrhage and glaucoma.

КОНТРОЛЬНА РОБОТА №48

Translate into Ukrainian

ACIDS

An **acid** is a molecule or ion capable of donating a hydron (proton or hydrogen ion H^+), or, alternatively, capable of forming a covalent bondwith an electron pair. Common aqueous acids include hydrochloric acid (a solution of hydrogen chloride which is found in gastric acid in the stomach and activates digestive enzymes), acetic acid (vinegar is a dilute aqueous solution of this liquid), sulfuric acid (used in car batteries), and citric acid (found in citrus fruits). As these examples show, acids (in the colloquial sense) can be solutions or pure substances, and can be derived from acids (in the strict sense) that are solids, liquids, or gases. Strong acids and some concentrated weak acids are corrosive, but there are exceptions such as carboranes and boric acid.

The strength of an acid refers to its ability or tendency to lose a proton. A strong acid is one that completely dissociates in water; in other words, one mole of a strong acid HA dissolves in water yielding one mole of H^+ and one mole of the conjugate base, A^-, and none of the protonated acid HA. In contrast, a weak acid only partially dissociates and at equilibrium, both the acid and the conjugate base are in solution. Examples of strong acids are hydrochloric acid (HCl), hydroiodic acid (HI), hydrobromic acid (HBr), perchloric acid($HClO_4$), nitric acid (HNO_3) and sulfuric acid (H_2SO_4). In water each of these essentially ionizes 100%. The stronger an acid is, the more easily it loses a proton, H^+. Two key factors that contribute to the ease of deprotonation are the polarity of the H—A bond and the size of atom A, which determines the strength of the H—A bond. Acid strengths are also often discussed in terms of the stability of the conjugate base.

Stronger acids have a larger K_a and a more negative pK_a than weaker acids.

Sulfonic acids, which are organic oxyacids, are a class of strong acids. A common example is toluenesulfonic acid (tosylic acid). Unlike sulfuric acid itself, sulfonic acids can be solids. In fact, polystyrene functionalized into polystyrene sulfonate is a solid strongly acidic plastic that is filterable.

Superacids are acids stronger than 100% sulfuric acid. Examples of superacids are fluoroantimonic acid, magic acid and perchloric acid. Superacids can permanently protonate water to give ionic, crystalline hydronium "salts". They can also quantitatively stabilize carbocations.

While K_a measures the strength of an acid compound, the strength of an aqueous acid solution is measured by pH, which is an indication of the concentration of hydronium in the solution. The pH of a simple solution of an acid compound in water is determined by the dilution of the compound and the compound's K_a.

Acids exist universally in our life. There are both numerous kinds of natural acid compounds with biological functions and massive synthesized acids which are used in many ways.

In industry

Acids are fundamental reagents in treating almost all processes in today's industry. Sulfuric acid, a diprotic acid, is the most widely used acid in industry, which is also the most-produced industrial chemical in the world. It is mainly used in producing fertilizer, detergent, batteries and dyes, as well as used in processing many products such like removing impurities. According to the statistics data in 2011, the annual production of sulfuric acid was around 200 million tonnes in the world.[16] For example, phosphate minerals react with sulfuric acid to produce phosphoric acid for the production of phosphate fertilizers, and zinc is produced by dissolving zinc oxide into sulfuric acid, purifying the solution and electrowinning.

In the chemical industry, acids react in neutralization reactions to produce salts. For example, nitric acid reacts with ammonia to produce ammonium nitrate, a fertilizer. Additionally, carboxylic acids can be esterified with alcohols, to produce esters.

Acids are often used to remove rust and other corrosion from metals in a process known as pickling. They may be used as an electrolyte in a wet cell battery, such as sulfuric acid in a car battery.

In food

Carbonated water (H_2CO_3 aqueous solution) is one of the main ingredients listed the ingredient sheet of a can of Coca-Cola.

Tartaric acid is an important component of some commonly used foods like unripened mangoes and tamarind. Natural fruits and vegetables also contain acids. Citric acid is present in oranges, lemon and other citrus fruits. Oxalic acid is present in tomatoes, spinach, and especially in carambola and rhubarb; rhubarb leaves and unripe carambolas are toxic because of high concentrations of oxalic acid. Ascorbic acid (Vitamin C) is an essential vitamin for the human body and is present in such foods as amla (Indian gooseberry), lemon, citrus fruits, and guava.

Many acids can be found in various kinds of food as additives, as they alter their taste and serve as preservatives. Phosphoric acid, for example, is a component of cola drinks. Acetic acid is used in day-to-day life as vinegar. Citric acid is used as a preservative in sauces and pickles.

Carbonic acid is one of the most common acid additive that is widely added in soft drinks, such as Coca-Cola. During the manufacturing process of soft drinks, CO_2 is usually pressurized to dissolve in these drinks to generate carbonic acid. Carbonic acid is very unstable and tend to decompose into water and CO_2 in normal temperature and pressure. Therefore, when we open the bottles or cans of these kinds of soft drinks, CO_2 bubbles come out and thus we feel 'sparks'.

Certain acids are used as drugs. Acetylsalicylic acid (Aspirin) is used as a pain killer and for bringing down fevers.

In human bodies

Acids play important roles in the human body. The hydrochloric acid present in the stomach aids digestion by breaking down large and complex food molecules. Amino acids are required for synthesis of proteins required for growth and repair of body tissues. Fatty acids are also required for growth and repair of body tissues. Nucleic acids are important for the manufacturing of DNA and RNA and transmitting of traits to offspring through genes. Carbonic acid is important for maintenance of pH equilibrium in the body.

Human bodies contain a variety of organic and inorganic compounds, among those dicarboxylic acids play an essential role in many biological behaviors. Many of those acids are amino acids which mainly serve as materials for the synthesis of proteins.[18] Other weak acids serve as buffers with their conjugate bases to keep the body's pH from undergoing large scale changes which would be harmful to cells. The rest of the dicarboxylic acids also participate in the synthesis of various biologically important compounds in human bodies.

EXERCISES.

I. *Read the following sentences and make questions*:

1. Acids, salts and bases are three great classes of chemical compounds.
2. The hydrogen determines the characteristic properties of the compounds.
3. The *ic* ending of the acid names indicates higher valence.
4. One of the most important acids is hydrochloric acid.
5. The hydrochloric acid is sometimes given as a medicine, when the natural supply is too small

II.*Give the opposite meaning of-the following words*:

sour positive concentrated
clean high liquid
single present. active
small more following

III. *Complete the following sentences*:

1. Acids are compounds containing h-—---n atoms.
2. A metal may take the place of h—n in. an acid and the formation of s--t results.
3. When the hydrogen is removed, the part of an acid remaining is called an a--d r----l.
4. Acids change b--e litmus to r-d.
5. Hydracids are acids containing h------n and a n-n-m---l.
6. Oxyacids are acids containing o----n, in addition to h------n and a non-metal.
7. An acid radical remains unchanged during a series of reactions and therefore is considered as a s----e a--m.
8. The *ic* ending of the acid names indicates higher v-----e and ability to hold more o----n than the *ous* ending.
9. Sulphurous acid has less oxygen than s---C A--d.
10. The dilute hydrochloric acid acts readily on zinc, iron, magnesium and aluminium, releasing h------n g-s.

V. *Suggestions for Composition Exercises (5-10 sentences each):*
1. Commercial use of hydrochloric acid.
2. First-aid in poisoning.
3. Safety first...
4. Care in handling laboratory glassware.
5. Labels indicating the contents...

Translate into Ukrainian. Put 10 questions to the text.

RADIOIODINE IN THE DIAGNOSIS OF THYROID DISEASE

Rapid progress has been made in the quarter-century with the introduction of radioactive iodine in medicine. It is used as a tool in the diagnosis of thyroid disease and in the study of thyroid physiology. A large number of tests utilizing radioactive iodine have been developed and applied to the study of thyroid function in human beings.

The results of radioisotope procedures often provide the physician with exact biochemical information about his patient, in making a diagnosis, however, he must not allow himself to rely upon such tests to the exclusion of other, nonradioactive diagnostic techniques. They are more prosaic but equally reliable sources of information such as a history and physical examination. Radioisotopic procedures should not be used during childhood or pregnancy unless the information attainable is absolutely essential to the patient's welfare.

Notes on Physiology of the Thyroid. The only known function of iodine in man (i.e. vertebrates including man) is in the formation of the thyroid hormones. Nearly all of the iodine enters via the gastrointestinal tract, in the food and water ingested. The element is usually in the form of iodide or iodate. The latter being easily converted to iodide in the stomach. Other possible sites of absorption are the skin, which may be important when iodine-containing cosmetics or antiseptics are used, and the respiratory tract, ordinary an unimportant site of absorption.

The average daily intake of iodine is of the order of 100 μg. The total body content of iodine is about 10 mg., the thyroid containing about 8 mg. The levels vary widely.

Determinations in Thyroid Disease. Much of the knowledge of thyroid function and behaviour of thyroid hormones has come from the use of radioiodine (I^{131}) in fundamental endocrinologic studies. The first step in the metabolism of iodine by the thyroid involves the active transport of iodine from the blood into the gland. Iodide is removed from the plasma by two competing mechanisms — concentration and storage in the thyroid, and excretion through the kidneys. The secondary concentrating mechanisms for iodine in the salivary glands, stomach, and mammary glands (lactating breast) are relatively unimportant compared to the concentrating ability of the normal thyroid which traps the iodide, binds it to protein, oxidizes it, and iodinates globulin in the tyrosine ring.

This process can be followed by determining the: 1) rate of uptake of radioactivity over the gland; 2) amount that is excreted; 3) rate of removal from the gland; and 4) amount that is bound to protein in the gland and which appears as protein-bound I^{131} in the plasma. These tests are not absolute tests for thyroid function or perfect substitutes for basal metabolic rate, serum protein-bound iodine and the usual clinical evaluation but they are very useful and will supply information obtainable in no other manner. Previous I^{131} tests, the use of antithyroid drugs or thyroid preparations, the recent consumption of iodine-containing foods and impaired renal function may alter or interfere with a given I^{131} test.

There are many tests available in the assessment of the functional state of the thyroid gland but most of these tests measure different aspects of thyroid function. It is usually advantageous to secure two or more tests when the diagnosis is in doubt.

The most frequently employed test is the thyroidal uptake of gm. Usually the patient is given an oral dose of 5 to 20 microcuries of I^{131} in water, and the fraction of this that accumulates in the neck is measured twenty-four hours later. Variations in the test include measuring at six hours or at forty-eight hours, plotting the accumulation by frequent measurements over the neck, and assaying the amount of I^{131} that appears in the urine during the first two days after administration. Normally the thyroid accumulates between 15 and 50 per cent of an administered dose of I^{131} within twenty-four hours. The maximal uptake is not reached until after 12 hours.

Thyroid I^{131} uptake values below 15 per cent occur in hypothyroid states. Uptake may be misleading, however, in cretins and hypothyroid children who may have a high uptake but low incorporation of I^{131} into the hormone.

Abnormally depressed values are also seen in patients receiving antithyroid drugs or iodide or thyroid preparations. In nontoxic goitre the results are variable. The uptake is a helpful guide to the amount of I^{131} needed therapeutically both in cancer and hyperthyroidism.

Although these procedures are useful adjuncts they do not make the uptake an absolute measure of thyroid function.

КОНТРОЛЬНА РОБОТА №49

Translate into Ukrainian

PROTEINS AND AMINO ACIDS

All amino acids and proteins behave alike towards both acids and bases. This means: as a weak acid towards a strong base a as a weak base towards a strong acid. For example, sodium hydroxide (a strong base) and glycine forms a sodium salt of the amino acid; with hydrochloric acid, glycine reacts forming a salt, glycine hydrochloride. Besides that, the basic group of one amino acid molecule may react with the acid group of a second molecule forming a dipeptide. The condensation of amino acids leads to building up proteins and this is called peptide linkage and the process can be repeated over and over again. The chief plant compounds containing nitrogen are the amino acids and the proteins. Proteins are made up of many amino acid groups linked together. Amino acids are compounds having both the properties of amines and also of acids. Every amino acid has a carboxyl group, COOH, and one or more amino groups. The name amino acids suggests as much. Therefore, the compounds have both the properties.

The simplest amino acid is glycine or aminoacetic acid. It is a colourless, crystalline powder. It is derivable from many proteins and it is used as a dietary supplement. Linkage (or bond) means the connection between different atoms or radicals of a chemical compound. A mark is used to indicate the number and attachment of the valencies of an atom in constitutional formulas. It is represented by a line or a dot between the atoms. Peptide, in turn, belongs to a class of compounds yielding two or more amino acids on hydrolysis. It is formed by the reaction of the groups of adjacent amino acids. They are known as di-, tri-, tetra-, etc., peptides depending upon the number of amino acids making up the molecule.

There are many naturally occurring amino acids. The substances are found either free as components of plant or animal tissues or as a product of the hydrolysis of protein. Several of them are essential in human nutrition. The essential amino acid is one that is essential for optimal growth in a young animal, or for nitrogen equilibrium in an adult. Those essential for nitrogen equilibrium in man are: isoleucine, leucine, lysine, methionine, phenylalanine, theonine, tryptophan, and valine. Histidine, in addition to the mentioned eight, is required by infants.

Proteins are among the most important substances in plants and animals. A protein is any one of a group of complex organic nitrogenous compounds widely distributed in plants and animals and which form the principal constituents of the cell protoplasm Therefore, proteins are substances which occur as separate molecules (with very large molecular weight), or as reticular constituents of cells, constituting their structural framework.

Proteins are separated into groups based chiefly on physical properties (solubility, coagulation, precipitation). These groups are: albumins, globulins, prolamines, nucleo-proteins, phosphoproteins (casein in milk), albuminoids, chromoproteins (colour of haemoglobin, in marine algae).

The human body contains many hundreds of different proteins.They have special structures to carry out specific tasks. The blood contains many different kinds of protein molecules, in solution in the plasma or within the cells of the blood. Hair, fingernails, skin, tendon and muscle fibres consist mainly of protein. Protein we find both in plant and animal food but to a higher degree in meat, eggs, milk, and cheese. Some vegetable foods (cereals, legumes, nuts) are fairly rich in proteins. Special enzymes convert proteins into simple amino acids so that the body can use them.

Synthetic proteins are highly complex polypeptides made in thelaboratory. They show most of the characteristics of nativeprotein.

The following reactions indicating the presence of a protein are applied to a solution or

suspension in water.

Millon's Test (for Proteins and Nitrogenous Compounds)

Reagent: A solution is made of 10 gm of mercury and 20 gm of nitric acid; this is diluted with an equal volume of water. After standing twenty-four hours it is decanted. The reagent gives a red colour (brick-red) with proteins and other substances (phenol tyrosine, and thymol) which contain the hydroxy-phenyl group.

Procedure: Add a few drops of the reagent and boil carefully.

Result: A red colour is produced.

Biuret Reaction (Test for Proteins)

To a solution of the protein in a test tube add about 2 c.c. of 40 per cent sodium hydroxide and one drop of a 1 per cent solution of copper sulphate. A pinkish-violet colour is produced.

Mulder's Test (Xanthoproteic Test)

Treat the suspected substance with nitric acid: proteins are turned yellow by it. If you alkalinize the substance, it becomes an orange yellow, due to the presence of the phenyl group.

EXERCISES

I. *Answer the following questions*:

1. What has every amino acid?
2. Which is the simplest amino acid?
3. What is peptide linkage?
4. Which amino acids are essential for human nutrition?
5. Which amino acid is required by infants?
6. What is a protein?
7. Which foods are rich in proteins?
8. What agents convert proteins into simple amino acids?
9. What can you say about synthetic proteins?
10. Do you know any test for proteins? Describe the procedure.

II. *Complete the following sentences*:

1. The simplest amino acid is ----- and it is used as a ------.
2. The condensation of amino acids leads to building up ----- and this is called---.
3. The essential amino acid is one that is essential for ----- ----- in a young animal, or for ----- ----- in an adult.
4. ---- are among the most important substances in plants and animals.
5. Protein we find both on ----- and ----- food.
6. All amino acids and proteins behave alike towards both ------ and -----.

III. *Fill in the missing words*:

1. Proteins are made ... ... many amino acids.
2 The condensation of amino acids leads ... building ... proteins.
3. He made that story....
4. She made ... her mind to do it ... again.
5. The process can be repeated ... and ... again.
6. They are known us di-, tri-, etc. peptides depending ... the number of amino acids making … the molecule.
7. Proteins are separated ... groups based chiefly ... physical properties.
8. Special enzymes convert proteins ... simple amino acids.
9. Some vegetable foods are fairly rich ... proteins.
10. They have special structures ... carry ... specific tasks.

V. *Suggestions for Composition Exercises (5-10 sentences each):*

1. Recent discoveries.
2. The Nobel Prize in Chemistry.
3. Synthetic proteins.
4. Foods rich in proteins…
5. Planning of a diet.

Translate into Ukrainian. Put 10 questions to the text.

SULPHONAMIDES

With the introduction of the sulphonamides, chemotherapy with drugs highly toxic for some bacteria and relatively innocuous for man have become possible (since 1933). The basic compound for this group of drugs is para-aminobenzene sulphonamide or sulphanilamide.

The sulphonamides exert their inhibitory effect against a variety of organisms. Within a few hours after exposure of susceptible bacteria to the sulphonamide compounds, multiplication diminishes and some bacteria are killed. Susceptibility to the sulphonamides varies greatly among the various sentitive strains of bacteria, and even among the members of the same strain.

Following oral administration, a peak blood concentration reached in, for all the derivatives, from 1 to 6 hours. The following sulphonamide preparations are in general use: sulphanilamide, sulphapyridine, sulphathiazole, sulphadiazine, sulphamerazine, sulphamethazine, sulphacetamide, sulphapyrazine, sulphaguanidine, sulphasuxidine or succinylsulphathiazole, sulphathalidine or phthalylsulphathiazole.

Sulphanilamide is absorbed most and sulphadiazine the least rapidly, the other sulphonamides show intermediary degrees of absorption. The sodium salts are absorbed more rapidly and completely than their acid analogues. Absorption occurs for the most part in the small intestine and can be increased by administration of larger doses or adequate amounts of sodium bicarbonate. Since the presence of food has an impeding effect absorption is delayed if the drugs are given after a meal. Only sulphanilamide is absorbed from the rectum in significant amounts. Sulphanilamide and available sodium salts of the other absorbable sulphonamides can be given subcutaneously or intravenously. Following intravenous administration, high blood levels are immediately reached and sustained during administration, only to fall rapidly within a few hours. After subcutaneous injection, the blood concentration rises more slowly, and is prolonged. High blood levels are often found after deposition intraperitoneally and on or into wounds.

Sulphaguanidine is the first of a series of sulphonamides which are effective and are not absorbed appreciably from the intestinal tract. They remain therapeutically active, and are therefore of value in the treatment of intestinal infections, and prophylactically in patients who are to have bowel surgery. Succinylsulphathiazole and phthalylsulphathiazole have generally replaced sulphaguanidine, since the latter is ineffective in the presence of ullcerative lesions of the bowel. The sulphonamides are excreted mainly through the kidneys. The concentrations in the urine vary from time to time, despite constant administration, and are usually 5 to 30 times the amounts present in the blood. The various sulphonamides are excreted at different rates. The excretion of the sulphonamides is hastened by the administration of sodium bicarbonate and intravenous infusions of distilled water, normal saline, and glucose solutions. Impaired renal function delays the excretion. The small amounts of the poorly absorbable sulphonamides which appear in the blood are also excreted in the kidneys. The absorbable sulphonamides pass from the blood into all the tissues and fluids of the body including the cerebrospinal and pleural fluid, saliva, pancreatic juice, bile, and breast milk. It has been demonstrated that these drugs diffuse across the placenta from the maternal into the foetal circulation and amniotic fluid.

After the sulphonamides are absorbed into the circulation, parts of the drug are changed by

ionization, acetylation or conjugation and by binding to plasma proteins. The greater the degree of ionization the more effective the drug. On the other hand, the greater the amount of conjugation with acetyl groups, called acetylation, the less the therapeutic efficiency. Binding to plasma protein not only ineffectuates the bacteriostatic effect of the drugs but inhibits their diffusion into the various body fluids, since certain membranes are relatively impermeable to protein compounds.

Administration. Oral administration should be used whenever possible. The sulphonamides should be given in doses of 4 to 6 g. for the initial dose and 1 g. every 4 hours day and night. Sulphamerazine is equally efficacious in doses of 3 g. initially and 1 g. every 6 hours. The doses for infants and children are calculated on the basis of 0.06 to 0.12 g. per pound of body weight for every 24-hour period. One-half the calculated amount is given as the initial dose, and for maintenance this amount is divided into 6 equal doses every 24 hours. Intravenous administration should be reserved for those instances in which it is desired rapidly to reach a high level or when it is necessary to increase the level quickly. Sulphanilamide can be given as a 1 per cent solution, whereas the others may be given in any strength up to a 5 per cent solution. The intravenous dose is the same as the initial oral dose. Subcutaneous administration is preferred for prolonged therapy when oral therapy is not possible. Sulphanilamide is given in a per cent solution and the sodium salts of the other absorbable sulphonamides in 0.5 to 1 per cent isotonic sodium chloride solution. One gram every 6 or 8 hours is generally adequate, since the peak level is not reached for from 2 to 6 hours and excretion proceeds slowly over the following 12 to 48 hours.

Toxicity. Mild toxic symptoms include lassitude, anorexia, and eyanosis. More important are: vomiting due to sulphonamide gasstritis, haematuria leading ultimately to suppression of urine, and rashes. When vomiting with each dose, the administration of the drug by mouth will have to be entirely stopped, and it should also be discontinued on the appearance of blood in the urine or of a rash. Haematuria is caused by the deposit of crystals of the drug in the kidneys and urinary passages, and in order to prevent this it is important to maintain a high fluid intake during sulphonamide treatment. The rash is as a rule morbilliform or scarlatiniform; but an eruption indistinguishable from erythema nodosum may occur. Acute haemolytic anaemia and agranulocytosis are, though fortunately rare, grave complications.

The drug should not be given in the presence of severe anaemia or leukopenia. Foods, such as eggs, that contain sulphur, sulphur containing drugs, and saline cathartics should be avoided for as long as sulphonamides are being given, because they increase the likelihood of cyanosis due to sulphhemoglobinemia. It is advantageous to prescribe small doses of alkali with the sulphonamides.

Although the sulphonamides were the first chemotherapeutic drugs which were so highly toxic for bacteria and relatively innocuous for the human host, it was to be anticipated that adverse manifestations would be observed.

The preparations: sulphaguanidine, succinylsulphathiazole and phthalylsulphathiazole are used to produce bacteriostasis in intestinal infections.

The other preparations mentioned are effective in pneumo-occal, meningococcal, gonococcal and *B. coli* infections as well as against the haemolytic streptococcus.

*

КОНТРОЛЬНА РОБОТА №50

Translate into Ukrainian

Chemistry

The most important characteristic of a substance is its uniformity of composition and the fact that all samples of a specific substance show the same properties. There are two kinds of properties: physical — colour, taste, odour, touch (slippery, gritty etc.), density, hardness, solubility and ability to conduct electricity and heat; in solids the shape of their crystals is significant; freezing and boiling points of liquids. Chemical properties are the changes in composition undergone by a substance when it is subjected to various conditions. The various changes may be physical and chemical. The physical properties tend to be temporary. In a chemical change the composition of the substance is changed and new products-are formed. Chemical changes are permanent.

All pure substances may be divided according to their composition into two main clasess — elements (metals and nonmetals) and compounds. Aside from such wellknown metals as iron, lead, copper and silver, nearly all the less familiar metals have names ending in -um or -ium and can be distinguished from the non-metals in this way.

The number of different chemical compounds is enormous. They are complex substances that can be decomposed into two or more elements (for example, water is a compound).

Laboratory investigations of compounds follow two general techniques —analysis and synthesis. Analysis is breaking down (decomposing) a compound into its constituent elements. They in turn are then identified by qualitative analysis, and their relative weight or volume is determined by quantitative analysis. The direct opposite of analysis is synthesis. Synthesis means building a compound from simpler compounds or elements. For example— water is analyzed when an electric current is passed through it, decomposing it into hydrogen and oxygen; it is synthesized when hydrogen gas is burned into the presence of oxygen forming water.

New techniques and new instruments are devised and invented because the field of chemistry, like other fields, is a growing subject

The Atomic Structure of Matter

All matter consists of atoms. The exceptional kinds of matter are the elementary particles from which atoms are made (electrons, protons, neutrons) and similar sub-atomic particles (positrons, mesons). Atoms are the structural units of all solids, liquids, and gases.

An atom consists of a central nucleus plus one or more electrons. Nucleus is small, heavy with positive electrical charge. Electron is light, with negative electrical charge. An aggregation of atoms forms a molecule. The molecules of different chemical substances contain varying numbers of atoms, bonded tightly together Therefore the number of atoms in a molecule varies with the compound.

A symbol is used to represent an atom of an element, as well as the element itself. For example, I represents the element iodine and the elementary substance. H2O stands for water-— the molecules of which contain two hydrogen atoms and one oxygen atom.

Classification of Common Types of Analysis.

Breaking down a compound into the elements of which it is composed is called analysis. The word assay is now applied to analysis in general but in particular it means the analysis ot pharmaceutical and official drugs. Assaying by dry methods is dry-assay and by wet methods it is wet-assay. An assay balance is also called an analytical balance.

The process of building up a compound from the elements is known as synthesis. Synthesis is therefore the reverse phenomena of an analysis.

Qualitative analysis means the detection of the kind or nature of an element or compound in a substance.

Qualitative (detection of the kind of substances present):

chemical by means of precipitation or wet method;

thermal by means of flame tests and blowpipe analysis;

optical by meaJis of spectroscopic »and crystal structure;

electrical by means of electrolysis; high frequency spectra;

mechanical by means of microscope analysis; specific gravity y hydrometers; biochemical by means of microorganisms (bacteria, yeasts) .

Quantitative analysis is the determination of the amount or quantity of an element or compound in a substance.

Quantitative (determination of the amount of substances present): mechanical by means of gravimetric methods (weighing the amount)

volumetric methods (titrating the amount);

gas-volumetric methods (measuring the quantity of gas);

thermal by means of combustion, and the absorption of the combustion gases; electrical by means of conductometry, pptentiometry, polarography; mass spectra;

optical by means of colorimetry, nephelometry; fluoroscopy.

EXERCISES

I. *Answer the following questions*:

1. What is chemistry?
2. What are the states of matter?
3. What kind of properties are there?
4. How do we distinguish substances?
5. What techniques are used in laboratory investigations of compounds?
6. What is analysis? synthesis?
7. Is the field of chemistry growing?
8. What does matter consist of?
9. What forms a molecule?
10. What is used to represent an atom of an element?

II. *Give opposites of the following:*

Decompose	boiling	heavy
Hardness	temporary	positive
Heat	analysis	tight
Solid	presence	complex

III. *Fill in the missing words*:

1. Sometimes one substance is transformed ... another.
2. All pure substances may be divided according ... their composition ... two main classes.
3. ..*all* the less familiar metals have names ending ... -*um* or -*ium.*
4. Constituent elements ... turn are identified ... qualitative analysis.
5. Water is analyzed when an. electric current is passed ... it.
6. Water is synthesized when hydrogen gas is burned ... the presence ... oxygen, forming water.
7. Complex substances can be decomposed ... one or two elements.
8. Decomposing means breaking ....
9. The number ... atoms ... a molecule varies ... the compound.
10. Symbols stand ... substances.

IV. *Write sentences with the following words:*

near — nearly hard-hardly late -lately

VI. ***Suggestions for- Composition Exercises*** *(5-10 sentences each):*

1. Inorganic chemistry and industry.
2. The importance of chemistry for the students of pharmacy
3. Chemistry in the Middle Ages.
4. Progress in chemistry and consequences.
5. A day in a chemical laboratory.

Translate into Ukrainian. Put 10 questions to the text.

ANTIBIOTICS
Penicillin

The development of penicillin has stimulated the discovery of new antibiotics. There are many centres where routine screening of every possible living organism is undertaken in an effort to isolate new antibiotics. Many prospects have been isolated, but only a few have satisfied the necessary criteria.

Penicillin is derived from the *Penicillium notatum* mould, and has both bacteriostatic and bacteriocidal effects. Of the different strains, the most efficient and the one in general use is penicillin G.

Penicillin is also without effect on virus infections.

Penicillin is destroyed by acids, alkalies and heat. It is rendered inert by synthetic rubber, and also by some common air bacteria. It passes rapidly from the blood into vascular tissues, but does not so rapidly penetrate the serous membranes or meninges. It is rapidly excreted in the urine. Although pure penicillin is non-toxic, impurities may cause such minor disturbances as fever and urticaria.

Administration. Modifications in the methods of giving penicilin continue to arise, and as this antibiotic is no longer a scarce commodity, larger doses are now employed. For systemic use, penicillin is given by intramuscular injection, and the daily dose may be calculated by allowing 5.000 units per lb. body-weight, divided into six-hourly injections. Attempts have been made to prolong the action of penicillin by delaying its absorption, and hence, by giving larger doses at longer intervals, relieve the patient of frequent injections. Penicillin has been used in oil and beeswax, but each injection must be administered with such force that it is being given up. The combination of procaine with penicillin retard its absorption, but the penicillin is rendered insoluble and has to be given as a suspension through a slightly larger needle.

There is some evidence that ordinary crystalline penicillin (soluble in water) is effective if given at twenty-hourly intervals, provided each dose is a large one such as 250,000-1,000,000 units.
Penicillin can, if required, be added to an intravenous drip in infants, although the likelihood of thrombosis of the vein is increased; as this method also raises the output of urine, and as the maintenance of hydration must not be hindered, it is better to rely on repeated intramuscular injections.

Penicillin may also be given intrathecally; into the serous cavities; into the accessory nasal sinuses; into the conjunctival sac; or it may be administed in lozenges or applied to the skin as a spray, or in a cream.

Although penicillin is destroyed by acids, success has been reported from oral administration in infants under six months, in whom gastric acidity is relatively low. The amount must be large, such as 20,000 units per lb. body-weight per day, and the doses timed to be given when the stomach is empty. The method does not commend itself to pediatricians because illnesses in infancy that require penicillin are sufficiently serious to hummand the most effective and reliable method of administration.

Penicillin is truly a remarkable drug. Its discovery was accidental; its development was

phenomenal; and its production extraordinary. Never before has any drug been studied so exhaustively in such a short period of time. It has established the old theory of antibiosis in medicine and created a new era in research and therapy.

Streptomycin

Streptomycin is the outcome of a systematic search for an antibiotic of value in the treatment of infections in which penicillin and sulphonamides have proved ineffective. The commercial product is a purified extract of the growth, on proper media of the mould *Streptomyces griseus.* It Is dispensed as sulphate, hydrochloride, trihydrochloride, calcium chloride, or phosphates.

Streptomycin is derived from *Adinotnyces* (resp. *Streptomyces) griseus,* and its great value lies in its bactericidal effect upon the tubercle bacillus. It is often effective, also, against coccal infections caused by *B. pyocyaneus, B. coli, B. proteus,* and *B. friedlanderi,* while in combination with sulphadiazine, it is effective in meningitis due to *B. influenzae.*

Unfortunately, streptomycin is more toxic than the other antibiotics, and these effects are naturally more likely when it has to be used over a long period, as in the case of tuberculous meningitis and miliary tuberculosis. It may account for persistent low fever and give rise to skin rashes, but its most injurious effect is on the nervous system, where it may damage the vestibular mechanism, interfere with vision, and lead to considerable mental impairment. During recovery from tuberculous meningitis, it is often difficult to decide whether damage to the nervous system is a legacy of the disease or a result of treatment. The intrathecal administration of streptomycin gives rise to a cell reaction and increase of protein in the cerebrospinal fluid, which may take several weeks to subside after treatment has been stopped. When used for infections other than tuberculosis, streptomycin can as a rule be discontinued after a week.

One disadvantage of streptomycin is that tubercle bacilli may become resistant to it, but the likelihood of this can be reduced by giving paraaminosalicylic acid (P.A.S.) by mouth.

Intrathecal injection of streptomycin is of value in meningeal infections. The usual intrathecal dose is 50 to 100 mg. (not to exceed 1 mg./kg. body-weight) every 24 to 48 hours.

Oral administration of streptomycin is ineffective in the treatment of systemic infections since 98% of the drug ingested is excreted in the faeces unchanged.

Chloramphenicol (Chloromycetin) and Aureomycin

These two antibiotics have the great advantage of being effective when given by mouth.

Chloromycetin is a crystalline antibiotic obtained by purification and concentration of cultures of *a Streptomyces species* in liquid media. It is a neutral compound which is relatively stable and soluble in watery solutions. It contains both nitrogen and nonionic chloride. The antibiotic is well absorbed from the gastrointestinal tract, and serum levels following oral administration are comparable to those obtained by parenteral injection. Chloromycetin is either excreted fairly rapidly, or inactivated. Present evidence indicates that it is effective in such rickettsial infections as epidemic and endemic typhus and in typhoid fever. Experimental investigations demonstrate antibacterial activity in vitro and in vivo in animals against other gram-negative bacteria, *Borrelia recurrentis, Mycobacterium tuberculosis,* gram-positive bacteria, and some viruses. The therapeutic doses recommended are 50 milligrams per kilogram of body-weight (50 mg./kg. body wt) initially and 0.25 g every 2 to 4 hours until the infection is under control. The drug appears to be non-toxic for all practical purposes.

Aureomycin is an antibiotic derived from a strain of *Strepto-myces aureofaciens* supplied as the crystalline hydrochloric salt. It is soluble in watery solutions, but deteriorates rapidly in alkaline solution at room temperature. Human serum appears to have an inhibiting effect. It is well absorbed from the gastrointestinal tract, and therapy can be accomplished by this route. Since intramuscular injection is quite painful, other routes of administration are preferable. Aureomycin possesses bacteriostatic bactericidal action against numerous gram-positive and gram-negative bacteria and some

viruses. It has been shown to be effective in the treatment of several rickettsial infections such as Rocky Mountain spotted fever and *Q* fever, brucellosis, urinary tract infections due to *Escherichia coli,* and lymphogranuloma venereum. It is relatively non-toxic. The dosage used at present is 0.5-0.75 g every 6 hours for from 7 to 14 days.

Other antibiotics

Terramycin from *Sireptomyces rimosus* is a yellow, odourless crystalline powder and has actions similar to aureomycin. It has proved effective in pneumonia, whooping cough, urinary infections from E. coli and Gonococcus. It is used as an antibiotic and antiprotozoan. Dose — orally: 1 to 2 g dairy, divided into 6-hourly doses. It is usually administered as terramycin hydrochloride. Toxicity: allergic reactions, nausea, vomiting, diarrhoea. Sometimes there may be nervous symptoms. Terramycin may bring about Vitamin K and Vitamin B complex deficiency. Terramycin is a proprietary brand of oxytetracycline.

Tetracycline. A yellow, odourless, crystalline powder with antibiotic activity against a wide range of organisms. It is usually administered as tetracycline hydrochloride. Dose — orally 1 g daily; intramuscularly 0.2-0.3 g daily; intravenously 0.5 g daily (every 12 hours); 3% cream for local dermal application (1-2 daily), for ophthalmic use (4-6 times daily) ointment are available.

It is used particularly in the primary bacterial pneumonia, acute cholangitis and cholecystitis, in infections of the urinary system. Toxic effects are vomiting, diarrhoea, allergic reactions. It is of no practical use in septicaemia.

Erythromycin (Ilotycin). An antibacterial substance produced by the growth of *Streptomyces erythreus,* occurring as white or slightly yellow crystals or powder. It is odourless with a bitter taste. It is easily soluble in alcohol and almost insoluble in water. It is used in infections caused by Grampositive microorganisms (pneumococcus, staphylococcus, and streptococcus) particularly when the organism is resistant to other antibiotics or when the patient is allergic. Dose — only orally 0.2 g every 6 hours, in severe infections 0.3-0.5 g every 6 hours. In brucellosis usually administered in doses 1.2-2.4 g daily divided into three doses. Children are given 6-8 mg. per kg body weight every 6 hours. Erythromycin possesses little toxicity.

Erythromycin produces bactericidal and bacteriostatic action. In acute infections resistant to other antibiotics erythromycin lactobionate is administered intramuscularly or intravenously. In allergic patients erythromycin glucoheptonate is administered intravenously. There is also erythromycin stearate administered orally. It is resistant to the acid action of the gastric juice and it gives the same concentration in blood as the main erythromycin.

Tyrothricin is an extract obtained from *B. brevis.* When applied locally it is of value in treating superficial ulcers, draining abscesses, empyema and pyodermatoses, due to gram-positive organisms such as staphylococci, streptococci and pneumococci. It is most effective when in direct local contact with the bacteria. Before administration the drug should be diluted with sterile distilled water to provide a concentration of 500 mcg./ml. Tyrothricin should never be given parenterally because of its toxicity.

Bacitracin is an antibiotic having a range of activity similar to that of penicillin. It is obtained from a strain of *B. subtilis.* It will inhibit the growth of streptococci, staphylococci, gonococci, meningococci, clostridia, *Tr. pallidum,* and *E. histolytica.* Bacitracin's effect is not altered by serum, pus or necrotic tissue. For maximum benefit an effective concentration of the antibiotic must be in contact with the pathogenic factor.

Bacitracin dissolved in sterile normal saline for parenteral use in a concentration of 500 u./cc. may be applied topically, or injected into such pyogenic lesions (caused by susceptible organisms) as furuncles, carbuncles, ulcers, paronychia, conjunctivitis, and pyodermatoses. Procaine, 1 to 2 per cent added to the solution to be used for local infiltration, will diminish the associated pain. One daily

injection of 0.2 to 5 cc. depending on the size of the lesion, usually is effective.

For ophthalmic use and for dermal application ointments containing bacitracin are recommended.

Tyrothricin and bacitracin are still little known and dosage schedules have not been completely determined for the enumerated conditions.

In conclusion, a word may be said against the random trial of sulphonamides and the various antibiotics. When dealing with infective illnesses, an invaluable guide to treatment is obtained if the infecting organism can be determined, since the sensitivity of such organism to these preparations can then be tested in the laboratory, and the appropriate method of attack instituted.

КОНТРОЛЬНА РОБОТА №51

Translate into Ukrainian

EXAMPLES OF ACIDS

The strength of an acid refers to its ability or tendency to lose a proton. A strong acid is one that completely dissociates in water; in other words, one mole of a strong acid HA dissolves in water yielding one mole of H^+ and one mole of the conjugate base, A^-, and none of the protonated acid HA. In contrast, a weak acid only partially dissociates and at equilibrium, both the acid and the conjugate base are in solution. Examples of strong acids are hydrochloric acid (HCl), hydroiodic acid (HI), hydrobromic acid (HBr), perchloric acid($HClO_4$), nitric acid (HNO_3) and sulfuric acid (H_2SO_4). In water each of these essentially ionizes 100%. The stronger an acid is, the more easily it loses a proton, H^+. Two key factors that contribute to the ease of deprotonation are the polarity of the H—A bond and the size of atom A, which determines the strength of the H—A bond. Acid strengths are also often discussed in terms of the stability of the conjugate base.

An acid is a molecule or ion capable of donating a hydron (proton or hydrogen ion H^+), or, alternatively, capable of forming a covalent bondwith an electron pair. Common aqueous acids include hydrochloric acid (a solution of hydrogen chloride which is found in gastric acid in the stomach and activates digestive enzymes), acetic acid (vinegar is a dilute aqueous solution of this liquid), sulfuric acid (used in car batteries), and citric acid (found in citrus fruits). As these examples show, acids (in the colloquial sense) can be solutions or pure substances, and can be derived from acids (in the strict sense) that are solids, liquids, or gases. Strong acids and some concentrated weak acids are corrosive, but there are exceptions such as carboranes and boric acid.

Stronger acids have a larger K_a and a more negative pK_a than weaker acids.

Sulfonic acids, which are organic oxyacids, are a class of strong acids. A common example is toluenesulfonic acid (tosylic acid). Unlike sulfuric acid itself, sulfonic acids can be solids. In fact, polystyrene functionalized into polystyrene sulfonate is a solid strongly acidic plastic that is filterable.

Superacids are acids stronger than 100% sulfuric acid. Examples of superacids are fluoroantimonic acid, magic acid and perchloric acid. Superacids can permanently protonate water to give ionic, crystalline hydronium "salts". They can also quantitatively stabilize carbocations.

While K_a measures the strength of an acid compound, the strength of an aqueous acid solution is measured by pH, which is an indication of the concentration of hydronium in the solution. The pH of a simple solution of an acid compound in water is determined by the dilution of the compound and the compound's K_a.

Acids exist universally in our life. There are both numerous kinds of natural acid compounds with biological functions and massive synthesized acids which are used in many ways.

Acids are fundamental reagents in treating almost all processes in today's industry. Sulfuric acid, a diprotic acid, is the most widely used acid in industry, which is also the most-produced industrial chemical in the world. It is mainly used in producing fertilizer, detergent, batteries and dyes, as well as used in processing many products such like removing impurities. According to the statistics data in 2011, the annual production of sulfuric acid was around 200 million tonnes in the world.[16] For example, phosphate minerals react with sulfuric acid to produce phosphoric acid for the production of phosphate fertilizers, and zinc is produced by dissolving zinc oxide into sulfuric acid, purifying the solution and electrowinning.

In the chemical industry, acids react in neutralization reactions to produce salts. For example, nitric acid reacts with ammonia to produce ammonium nitrate, a fertilizer. Additionally, carboxylic acids can be esterified with alcohols, to produce esters.

Acids are often used to remove rust and other corrosion from metals in a process known as pickling. They may be used as an electrolyte in a wet cell battery, such as sulfuric acid in a car battery.

Carbonated water (H_2CO_3 aqueous solution) is one of the main ingredients listed the ingredient sheet of a can of Coca-Cola.

Tartaric acid is an important component of some commonly used foods like unripened mangoes and tamarind. Natural fruits and vegetables also contain acids. Citric acid is present in oranges, lemon and other citrus fruits. Oxalic acid is present in tomatoes, spinach, and especially in carambola and rhubarb; rhubarb leaves and unripe carambolas are toxic because of high concentrations of oxalic acid. Ascorbic acid (Vitamin C) is an essential vitamin for the human body and is present in such foods as amla (Indian gooseberry), lemon, citrus fruits, and guava.

Many acids can be found in various kinds of food as additives, as they alter their taste and serve as preservatives. Phosphoric acid, for example, is a component of cola drinks. Acetic acid is used in day-to-day life as vinegar. Citric acid is used as a preservative in sauces and pickles.

Carbonic acid is one of the most common acid additive that is widely added in soft drinks, such as Coca-Cola. During the manufacturing process of soft drinks, CO_2 is usually pressurized to dissolve in these drinks to generate carbonic acid. Carbonic acid is very unstable and tend to decompose into water and CO_2 in normal temperature and pressure. Therefore, when we open the bottles or cans of these kinds of soft drinks, CO_2 bubbles come out and thus we feel 'sparks'.

Certain acids are used as drugs. Acetylsalicylic acid (Aspirin) is used as a pain killer and for bringing down fevers.

Acids play important roles in the human body. The hydrochloric acid present in the stomach aids digestion by breaking down large and complex food molecules. Amino acids are required for synthesis of proteins required for growth and repair of body tissues. Fatty acids are also required for growth and repair of body tissues. Nucleic acids are important for the manufacturing of DNA and RNA and transmitting of traits to offspring through genes. Carbonic acid is important for maintenance of pH equilibrium in the body.

Human bodies contain a variety of organic and inorganic compounds, among those dicarboxylic acids play an essential role in many biological behaviors. Many of those acids are amino acids which mainly serve as materials for the synthesis of proteins.[18] Other weak acids serve as buffers with their conjugate bases to keep the body's pH from undergoing large scale changes which would be harmful to cells. The rest of the dicarboxylic acids also participate in the synthesis of various biologically important compounds in human bodies.

EXERCISES.

1. Answer the following questions
    1. How do acids taste? 2. What is a safe way to test for an Acid? 3. What determines the strength of an acid or a base? 4. What color does litmus paper turn in the presence of an acid? 5. Why do acids and bases neutralize each other? 6. Where are the following found on the pH chart? a. Strong acids? b. Strong bases? 7. How does the concentration of hydrogen ions change on the pH chart? 8. How do acids feel on your skin? 9. What gas is produced when acids react with metals?
    2. *Read the following sentences and make questions*:
        1. Acids, salts and bases are three great classes of chemical compounds.
        2. The hydrogen determines the characteristic properties of the compounds.
        3. The *ic* ending of the acid names indicates higher valence.
        4. One of the most important acids is hydrochloric acid.

5. The hydrochloric acid is sometimes given as a medicine, when the natural supply is too small.

III. *Fill in the missing words*:

1. Proteins are made ... ... many amino acids.
2 The condensation of amino acids leads ... building ... proteins.
3. He made that story....
4. She made ... her mind to do it ... again.
5. The process can be repeated ... and ... again.
6. They are known us di-, tri-, etc. peptides depending ... the number of amino acids making … the molecule.
7. Proteins are separated ... groups based chiefly ... physical properties.
8. Special enzymes convert proteins ... simple amino acids.
9. Some vegetable foods are fairly rich ... proteins.
10. They have special structures ... carry ... specific tasks.

V. *Suggestions for Composition Exercises (5-10 sentences each):*

1)Water-the most important chemical substance.
2)Waters are threatened by Man.
3)A day on the Sahara Desert.
4)A day in the life of a foundry worker.
5)Mineral springs in your country.

Translate into Ukrainian. Put 10 questions to the text.

ANTIPYRETICS

Antipyretics are agents or drugs which reduce the temperature in febrile conditions. This can be brought about by physical means, i.e. by external cooling such as tepid sponging, baths, wet packs; by depressing the temperature-regulating centre (in the hypothalamus), e.g. salicylates. Antipyresis can be effected also by drugs which cause peripheral vasodilation by increasing the heat loss through dilatation of the cutaneous vessels and increased perspiration, e.g. alcohol, nitrates.

Although the antipyretic drugs were introduced into medicine for their antipyretic action, many of them are now used for their analgesic action.

The salicylates are the best known and the most widely used agents because of their comparatively low toxicity and their effectiveness in the reducing of the pain of headache and neuralgias, the chief representatives of this group are: salicylic acid, sodium salicylate, acetylsalicylic acid (aspirin).

The salicylates are powerful antipyretics lowering the point of thermal equilibrium through a depressant action on the heat-regulating centre in the hypothalamus. The augmented loss of heat from cutaneous dilatation and increased perspiration bring about the fall in temperature. Salicylates are absorbed rapidly from the small intestine. The excretion commences in 15 minutes and is completed within 12 to 24 hours. About 75% is eliminated by the kidney in the form of salicylates but a portion is oxidized to oxysalicylic acid and some is combined with glycuronic acid. Traces of salicylates will be found excreted in the salivary, gastric and sweat secretion. Moderate doses produce headache, nausea and vomiting, ringing in the ears and dullness of hearing, profuse perspiration, increased rapidity of the heart, and blurred vision. These symptoms subside if the dose is reduced.

During the therapeutic use of salicylates chronic salicylate poisoning (salicylism) may be encountered. The chief symptoms include headache, tinnitus, blurred vision, hyperpnoea, haemat-emesis and mental disturbances. Acute salicylate poisoning usually results from the accidental ingestion or the consumption of a large dose of the drug for suicidal purposes. The symptoms include

hyperpyrexia, hyperpnoea, ketosis and mental disturbances. Treatment consists of gastric lavage to remove any unabsorbed drug and the administration of fluids.

Salicylate toxicity may be occasionally manifested by the nature of an allergic response. The symptoms may be sometimes quite alarming. The chief symptoms include angioneurotic oedema of the face and glottis and skin rashes.

Recent studies suggest that the salicylates may cause haemorrhage by an increase in clotting time. Large doses of salicylates lower the prothrombin content of the blood. Studies on patients have shown that patients whose prothrombin level is appreciably lowered should receive prophylactic doses of Vitamin K.

Sodium salicylale (C_6H_4.OH.COONa) — is composed of small colourless, inodorous, pearly crystals of unpleasant taste (sweetish). Sodium salicylate tablets should be dissolved in water before administration (0.3 g — 1 tablet). It is a useful antipyretic and rapid in action. It is employed in two distinct classes of cases i.e. in pyrexia (as in influenza, pneumonia, pyaemia) and is considered a specific agent in acute rheumatism reducing the temperature, relieving the pain, redness and swelling of the joints within three to five days and shortening the duration of the illness, it is now generally believed that the best results are achieved by maintaining a plasma-salicylate level of at least from 25 to 35 mg per cent (which requires doses of 10 gm per day every four hours — best given after the food intake). High plasma concentrations are rapidly obtained after oral administration. Administration may be either oral, rectal or intravenous. Intravenous administration is resorted to when the patient is unable to retain oral doses. Since toxic symptoms may become too severe when employing such high doses the treatment should be discontinued.

Sodium salicylate should be given at first in large doses 0.12 to 2 g every 2 to 4 hours. When the temperature is normal, 0.6 to 1 g should be given every four hours for two or three weeks. The dose must be gradually reduced as relapses are frequent owing to sudden discontinuance.

The response to salicylates is usually dramatic; the arthritis subsides in 24 to 72 hours, as does the fever, and the patient appears improved.

Recently para-aminobenzoic acid has been tried therapeutically but further evaluation will be necessary. Prompt remissions of the acute attack of rheumatic fever have been obtained with the use of either the adrenocortical hormone, cortison (Compound E), or the adrenocorticotropic hormone (AGTH) but their true effectiveness is still to be determined.

Acetylsalicylic acid ($CH_3.C0_2C_6H_4$.COOH) — is a white crystalline, inodorous powder of slightly acid taste.

Acetylsalicylic acid is less effective than sodium salicylate in acute rheumatism but it is a valuable antipyretic in catarrhal, influenzal or infectious fevers and in subacute rheumatism. Aspirin does not produce salicylism, but over-dosage, or idiosyncrasy to it, may cause urticaria, itching, or oedema of the facial area. Since it does not impair the cerebral functions it relieves moderate pain and therefore it is used as an analgesic in a variety of painful conditions (nervous headache, myalgia, dental caries, trigeminal neuralgia, migraine, articular rheumatism, gout). It is often useful to facilitate sleep in these conditions.

Amidopyrine (Aminopyrine, Pyramidon) – dimethyl-amino-phenyl-dimethyl-pyrazolone (C_6H_BN.GO.C.N. $(CH_3)_2$.NC$(CH_3)_2$). It is a white powder or colourless, odourless, tasteless crystals. It acts as an antipyretic and anodyne. Its effects are slower and more prolonged. It is used in influenzal and infectious fevers and for neuralgias. The allergic response to this drug is common. It inhibits the formation of granulocytes by the bone marrow and agranulocytosis is a common sequel of its use. This drug should be abandoned in therapy in favour of the safer antipyretics. There are many proprietary analgesics which contain this drug. The following are very popular: Veronal, Allonal, Cibalgin, and many others.

Quinine is an antipyretic. It diminishes heat production and increases heat loss by direct

depression of the thermo-regulating centre and by dilatation of the superficial vessels.

Quinine is the chief alkaloid in cinchona bark. It is a protoplasmic poison particularly toxic to leukocytes and protozoa (1:10,000).

Quinine is rapidly absorbed from the gastro-intestinal tract and from intramuscular injection. The rapid metabolism of quinine makes it a noncumulative drug. Sometimes small doses cause a slight acceleration of the pulse. Large doses weaken the heart muscle and relax the arterioles producing a fall in bloodpressure, sweating, flushing of the skin. Quinine has little or no effect on a normal temperature.

Quinine salts increase the number of lymphocytes in the circulation by contracting the plain muscle of the spleen.

Toxic symptoms are collectively known as "cinchonism or quinism" and consist of headache, ringing in the ears, some impairment of vision, muscular weakness and less commonly skin rash. The aural symptoms have been ascribed to congestion of the tympanum and to degenerative changes in the spiral ganglion of the cochlea.

High doses of quinine have been known to cause blindness (quinine amblyopia). The oculai symptoms consist in dilated pupils, obscured vision which apparently are due to a spasm the retinal arterioles.

Quinine is a valuables moans at full term of exciting labour since quinine salts stimulate uterine muscle.

The chief value of quinine is as a suppressive for malaria. It is also prescribed for uifluenzal and catarrhal colds, usually together with salicylates.

Quinine salts are extremely bitter in taste and are used as bitters. In the mouth they stimulate the taste buds and this in turn induces reflexly a free flow of saliva and excites an increased flow of secretion from the gastric glands. The object of prescribing bitters is to arouse the normal reflex to food and to improve digestion. Prolonged use of bitters, by causing fatigue of the reflex, may diminish gastric reflex.

Quinine salts should be given by the oral route in single doses of 0.1-1 g. Intramuscular injections may be followed by tissue infiltrations and even necrosis. Intravenous administration may be followed by cardiovascular collapse. Intravenous dosage is usually given as a last resort in serious cases when for some reason the patient is unable to absorb the drug.

During excretion, quinine may irritate the kidney and large doses can cause albuminuria.

As soon as malaria is clinically diagnosed, quinine in dosage of 1.2 to 2 g should be given by mouth daily for 5 to 7 days, i.e. until two expected attacks are aborted and the temperature remains normal.

КОНТРОЛЬНА РОБОТА №52

Translate into Ukrainian

ORGANIC ACIDS

Organic acids are widely distributed in nature as they occur in animal, plant, and microbial sources. They contain one or more carboxylic acid groups, which may be covalently linked in groups such as amides, esters, and peptides. Production of organic acids on a large industrial scale is mainly confined to acids of microbial origin. A number of organic acids of bacterial and fungal origin are important industrial products, the biological production of which has a definite economic advantage over chemical synthesis.The simplest organic acid is formic acid. It can be made by distilling ants. Its name comes from the Latin word for ant. The second member of the homologous series of carboxylic acids is acetic acid. It is the acidic constituent of vinegar. Vinegar (crude acetic acid) is manufactured by oxidizing alcohol with atmospheric oxygen, using a bacterium (B.Aceti,"mother of vinegar"), or more probably an enzyme which it secretes, as a contact agent. The dilute alcohol, in the form, for example, of "hard" cider (fermented apple juice), is allowed to trickle over shavings in a barrel. The shavings are inoculated with the B. Aceti by preliminary wetting with vinegar. Holes in the sides admit a plentiful supply of air, to the action of the oxygen of which the liquid is exposed by being spread over the surface of the shavings. The liquid (vinegar), which issues at the bottom, contains from 5 to 15 per cent of acetic acid, besides colouring and flavouring matters derived from the fruit juices.

Pure acetic acid may be prepared by distilling the vinegar repeatedly. It is derived more cheaply, however, from the liquid distillate obtained by heating wood in the manufacture of charcoal. Large quantities are used in the manufacture of various synthetic products.

Some of the important organic acids occurring in nature: palmitic acid, stearic acid, oleic acid (a carboxyl group at the end of a long hydrocarbon chain).

Lactic acid is a hydroxy-acetic acid. It contains a hydroxyl group as well as a carboxyl group. It is formed when milk sours and when cabbage ferments giving sour taste to milk and sauerkraut.

Oxalic acid, which is a poisonous substance produced in the course of plant metabolism consists of two carboxyl groups bonded together. Oxalic acid converted into an insoluble form (calcium oxalate) is rendered harmless to the plants.

Tartaric acid, which occurs in grapes, is a dihydroxydicarboxylic acid. It is known in four forms: levo", dextro-, para- and mesotartaric acid.

Citric acid, a tribasic, crystalline acid, is a hydroxytricarboxylic acid. It occurs in citrus fruits (lemons, limes, etc.). It forms citrates. It is an antiscorbutic, a diuretic and refrigerant.

Acids and alcohols interact slowly and incompletely to form esters. Therefore, esters are the products of reaction of acids and alcohols. Thus when ethyl alcohol and acetic acid are used we obtain ethyl acetate.

Esters form the sweet-smelling constituents (flavour and odour) of plants (flowers and fruits). They are used in perfumes and flavourings. Many are now produced synthetically as substitutes for natural flower and fruit essences. For example, the fragrance of ripe apples is due to minute amounts of the amyl esters of formic, acetic and caproic acids. In bananas the characteristic ester is amyl acetate.

Natural fats and oils are also esters (mainly of the trihydroxy alcohol glycerol).Animal fats consist mainly of the glyceryl esters of palmitic acid and stearic acid.Glyceryl palmitate and stearate form the solid fats. The glyceryl ester of oleic acid is glyceryl oleate and it is found in olive oil, whale oil, and in the fats of cold-blooded animals. These last mentioned fats tend to remain liquid at ordinary temperatures.

The main chemical property of the fats and oils, and in fact of esters, is that each can be decomposed, or hydrolyzed, to give back the alcohol and acid from which it is derived. Thus, when

ethyl acetate is boiled with water, it is slowly decomposed into ethyl alcohol and acetic acid. When fat is boiled with sodium hydroxide (strong alkali), glycerine and sodium salts of the fatty acids, sodium palmitate, sodium stearate, and sodium oleate, are formed. These sodium salts (of the fatty acids) are known as soaps and the operation is called saponification. The sodium palmitate or other sodium soap is soluble in water. Soft soap is made with potassium hydroxide and is composed of the potassium salts of the organic acids.

The functional groups of organic acids can serve as excellent natural starting materials for the chemical industry in applications best suited to a sustainable industrial society. Production of organic acids from bioprocesses can be increased only if it is cost effective. Therefore, existing and even established processes need to be improved for higher yields and higher product concentrations. Genetic engineering and metabolic engineering of the producer microorganisms offer the means of strategic planning for such improvements along with the development of highly sophisticated cultivation techniques such as continuous culture and cell-recycle, or retention, techniques.

EXERCISES

I.*Answer the following questions*:

1. Which compounds are known as organic acids?
2. Which is the simplest organic acid?
3. What is vinegar?
4. How can we prepare pure acetic acid?
5. Do organic acids occur in nature? which?
6. Where do we find oxalic acid?
7. What is formed when milk sours?
8. What is the action of citric acid?
9. How are esters formed?
10. Which constituents of plants do the esters form?
11. Which esters are found in animal fats?
12. What is the chief property (chemical) of esters?
13. What is saponification?
14. What is aspirin?
15. When do we use aspirin?

II. Fill in the correct form of the verb given: Present Tense Simple or Progressive

1. Dad _____ us to school every morning. (DRIVE) 2. Max _____ at an Internet café this summer. (WORK) 3. We _____ abroad this year because of the pandemic. (NOT GO) 4. It never _____ in the Atacama Desert in Chile. (RAIN) 5. Marty _____ to the fitness centre on Mondays. (NOT USUALLY GO) 6. What is that? – I _____ sounds that are not there. (HEAR) 7. We _____ of leaving Britain next year. We might go to America. (THINK) 8. I _____ my ex-husband next Monday. (SEE) 9. This box _____ a lot. What is in it? (WEIGH) 10.What _____ under the table? – Is there anything wrong? (YOU DO) 11.She never _____ to anyone about her problems. (TALK) 12.Mary _____ very sad. What's happened to her? (LOOK) 13.They _____ a few days in Stockholm next month. (SPEND) 14.You can't go in. They _____ a meeting. (HAVE) 15.I _____ I'll have a cup of coffee. I'm so tired. (THINK).

III. Circle the correct word(s) to complete each sentence.

1. My computer is more efficient than your / than yours. 2. The white coat is warmer then / than the gray one. 3. Ellen buys nicer clothes than I do / than I am. 4. Cars are expensive, but houses are more expensive / more expensive than. 5. Does your new stereo play music more loudly than your old one was / did? 6. Harry's motorcycle is newer than my / mine. 7. Cho's package arrived more quickly than Kelly's did / than Kelly's was. 8. Dave is 27 years old. His sister is older than he is / than he does.

IV. *Suggestions for Composition Exercises (5-10 sentences each):*

1. Recent discoveries.
2. The Nobel Prize in Chemistry.
3. Synthetic proteins.
4. Foods rich in proteins…
5. Planning of a diet.

Translate into Ukrainian. Put 10 questions to the text.

CHICKENPOX

Chickenpox is a highly contagious illness caused by primary infection with varicella zoster virus (VZV). It generally begins with a vesicular skin rash appearing in two or three waves, mainly on the body and head rather than the hands and becoming itchy raw pockmarks, small open sores which heal mostly without scarring.

Chickenpox has a 10-21 day incubation period and is spread easily through aerosolized droplets from the nasopharynx of ill individuals or through direct contact with secretions from the rash. Following primary infection there is usually lifelong protective immunity from further episodes of chickenpox.

Chickenpox is rarely fatal, although it is generally more severe in adults than in children. Pregnant women and those with a suppressed immune system are at highest risk of serious complications. The most common late complication of chicken pox is shingles, caused by reactivation of the varicella zoster virus decades after the initial episode of chickenpox.

Signs and symptoms

Chickenpox is a highly contagious disease that spreads from person to person by direct contact or by air from an infected person's coughing or sneezing. Touching the fluid from a chickenpox blister can also spread the disease. A person with chickenpox is contagious from one to five days before the rash appears. The contagious period continues until all blisters have formed scabs, which may take 5 to 10 days. It takes from 10 to 21 days after contact with an infected person for someone to develop chickenpox.

The chicken pox lesions (blisters) start as a two to four millimeter red papule which develops an irregular outline (a *rose petal*). A thin-walled, clear vesicle (*dew drop*) develops on top of the area of redness. This "dew drop on a rose petal" lesion is very characteristic of chickenpox. After about 8 to 12 hours the fluid in the vesicle becomes cloudy and the vesicle breaks leaving a crust. The fluid is highly contagious, but once the lesion crusts over, it is not considered contagious. The crust usually falls off after seven days sometimes leaving a crater-like scar. Although one lesion goes through this complete cycle in about seven days, another hallmark of chickenpox is that new lesions crop up every day for several days. Therefore, it may be a week before new lesions stop appearing and existing lesions crust over. Children should not be sent back to school until all lesions have crusted over.

It is not necessary to have physical contact with the infected person for the disease to spread. Infected persons can spread chickenpox before they know they have the disease, i.e. before any rash develops. They can infect others from about two days before the rash develops until all the sores have crusted over, usually four or five days after the rash starts.

Infection in pregnancy and neonates

For pregnant women, antibodies, produced as a result of immunisation or previous infection, are transferred via the placenta to the infant. Women who are immune to chickenpox cannot become infected and do not need to be concerned about it for themselves or their infant during pregnancy.

Varicella infection in pregnant women can lead to viral transmission via the placenta and infection of the foetus. If infection occurs during the first 28 weeks of gestation, this can lead to fetal varicella syndrome (also known as congenital varicella syndrome). Effects on the foetus can range in severity from underdeveloped toes and fingers to severe anal and bladder malformation. Possible problems include:

- Damage to brain: encephalitis, microcephaly, hydrocephaly, aplasia of brain.
- Damage to the eye (optic stalk, optic cap, and lens vesicles), microphthalmia, cataracts, chorioretinitis, optic atrophy.
- Other neurological disorder: damage to cervical and lumbosacral spinal cord, motor/sensory deficits, absent deep tendon reflexes, anisocoria/Horner's syndrome.
- Damage to body: hypoplasia of upper/lower extremities, anal and bladder sphincter dysfunction.
- Skin disorders: (cicatricial) skin lesions, hypopigmentation.

Infection late in gestation or immediately following birth is referred to as neonatal varicella. Maternal infection is associated with premature delivery. The risk of the baby developing the disease is greatest following exposure to infection in the period 7 days prior to delivery and up to 7 days following the birth. The baby may also be exposed to the virus via infectious siblings or other contacts, but this is of less concern if the mother is immune. Newborns who develop symptoms are at a high risk of pneumonia and other serious complications of the disease.

Pathophysiology

Chickenpox is usually acquired by the inhalation of airborne droplets from an infected host. After initial inhalation of contaminated respiratory droplets, the virus infects the mucosae of the upper respiratory tract. Viral proliferation occurs in regional lymph nodes of the upper respiratory tract 2-4 days after initial infection and is followed by primary viremia on postinfection days 4-6. A second round of viral replication occurs in the body's internal organs, most notably the liver and the spleen, followed by a secondary viremia 14-16 days postinfection. This secondary viremia is characterized by diffuse viral invasion of capillary endothelial cells and the epidermis.

Exposure to VZV in a healthy child initiates the production of host immunoglobulin G (IgG), immunoglobulin M (IgM), and immunoglobulin A (IgA) antibodies; IgG antibodies persist for life and confer immunity. After primary infection, VZV is hypothesized to spread from mucosal and epidermal lesions to local sensory nerves. VZV then remains latent in the dorsal ganglion cells of the sensory nerves. Reactivation of VZV results in the clinically distinct syndrome of herpes zoster (shingles).

Diagnosis

The diagnosis of varicella is primarily clinical. In a non-immunized individual with typical prodromal symptoms associated with the appropriate appearing rash occurring in "crops", no further investigation would normally be undertaken.

If further investigation is undertaken, confirmation of the diagnosis can be sought through either examination of the fluid within the vesicles, or by testing blood for evidence of an acute immunologic response. Vesicle fluid can be examined with a Tsanck smear, or better with examination for direct

fluorescent antibody. The fluid can also be "cultured", whereby attempts are made to grow the virus from a fluid sample. Blood tests can be used to identify a response to acute infection (IgM) or previous infection and subsequent immunity (IgG).

Prevention

A varicella vaccine was first developed by Michiaki Takahashi in 1974 derived from the Oka strain. Protection is not life-long and further vaccination is necessary five years after the initial immunization.

Treatment

There is no evidence to support the effectiveness of topical application of calamine lotion, a topical barrier preparation containing zinc oxide in spite of its wide usage and excellent safety profile. It is important to maintain good hygiene and daily cleaning of skin with warm water to avoid secondary bacterial infection. To relieve the symptoms of chicken pox, people commonly use anti-itching creams and lotions. These lotions are not to be used on the face or close to the eyes. An oatmeal bath also might help ease discomfort. Infection in otherwise healthy adults tends to be more severe and active; treatment with antiviral drugs (e.g. aciclovir) is generally advised, as long as it is started within 24-48 hours from rash onset. Patients of any age with depressed immune systems or extensive eczema are at risk of more severe disease and should also be treated with antiviral medication.

Prognosis

The duration of the visible blistering caused by varicella zoster virus varies in children usually from 4 to 7 days, and the appearance of new blisters begins to subside after the 5th day. Chickenpox infection is milder in young children, and symptomatic treatment, with sodium bicarbonate baths or antihistamine medication may ease itching. Paracetamol (acetaminophen) is widely used to reduce fever.

In adults, the disease can be more severe, though the incidence is much less common. Infection in adults is associated with greater morbidity and mortality due to pneumonia, hepatitis, and encephalitis. In particular, up to 10% of pregnant women with chickenpox develop pneumonia, the severity of which increases with onset later in gestation. Inflammation of the brain, or encephalitis, can occur in immunocompromised individuals, although the risk is higher with herpes zoster. Ninety percent of cases of varicella pneumonia occur in the adult population. Rarer complications of disseminated chickenpox also include myocarditis, hepatitis, and glomerulonephritis. Hemorrhagic complications are more common in the immunocompromised or immunosuppressed populations.

Epidemiology

Primary varicella is an endemic disease. Cases of varicella are seen throughout the year but more commonly in winter and early spring. In contrast, herpes zoster occurs sporadically and evenly throughout the year. Varicella is one of the classic diseases of childhood, with the highest prevalence in the 4-10 years age group. Like rubella, it is uncommon in preschool children. Varicella is highly communicable, with an infection rate of 90% in close contacts. Most people become infected before adulthood but 10% of young adults remain susceptible. Historically, varicella has been a disease predominantly affecting preschool and school-aged children.

History

Chickenpox was first identified by the Persian physician, Muhammad ibn Zakariya ar-Razi (865–925), known to the West as "Rhazes", who clearly distinguished it from smallpox and measles. Giovanni Filippo (1510–1580) of Palermo later provided a more detailed description of varicella (chickenpox). Subsequently in the 1600s, an English physician named Richard Morton described what he thought a mild form of smallpox as "chicken pox". Later, in 1767, a physician named William

Heberden, also from England, was the first physician to clearly demonstrate that chickenpox was different from smallpox. However, it is believed the name chickenpox was commonly used in earlier centuries before doctors identified the disease.

There are many explanations offered for the origin of the name chickenpox:

- Samuel Johnson suggested that the disease was "less dangerous", thus a "chicken" version of the pox;
- the specks that appear looked as though the skin was pecked by chickens;
- the disease was named after chick peas, from a supposed similarity in size of the seed to the lesions;
- the term reflects a corruption of the Old English word giccin, which meant itching.

As "pox" also means curse, in medieval times some believed it was a plague brought on to curse children by the use of black magic.

КОНТРОЛЬНА РОБОТА №53

Translate into Ukrainian

Physical Properties of Hydrogen

Hydrogen is the smallest chemical element because it consists of only one proton in its nucleus. Its symbol is H, and its atomic number is 1. It has an average atomic weight of 1.0079 amu, making it the lightest element. Hydrogen is the most abundant chemical substance in the universe, especially in stars and gas giant planets. However, monoatomic hydrogen is rare on Earth is rare due to its propensity to form covalent bonds with most elements. At standard temperature and pressure, hydrogen is a nontoxic, nonmetallic, odorless, tasteless, colorless, and highly combustible diatomic gas with the molecular formula H_2. Hydrogen is also prevalent on Earth in the form of chemical compounds such as hydrocarbons and water.

Hydrogen has one one proton and one electron; the most common isotope, protium (^1H), has no neutrons. Hydrogen has a melting point of -259.14 °C and a boiling point of -252.87 °C. Hydrogen has a density of 0.08988 g/L, making it less dense than air. It has two distinct oxidation states, (+1, -1), which make it able to act as both an oxidizing and a reducing agent. Its covalent radius is 31.5 pm.

Hydrogen exists in two different spin isomers of hydrogen diatomic molecules that differ by the relative spin of their nuclei. The orthohydrogen form has parallel spins; the parahydrogen form has antiparallel spins. At standard temperature and pressure, hydrogen gas consists of 75 percent orthohydrogen and 25 percent parahydrogen. Hydrogen is available in different forms, such as compressed gaseous hydrogen, liquid hydrogen, and slush hydrogen (composed of liquid and solid), as well as solid and metallic forms.

The Hydrogen Atom Many of the hydrogen atom's chemical properties arise from its small size, such as its propensity to form covalent bonds, flammability, and spontaneous reaction with oxidizing elements.

Chemical Properties of Hydrogen

Hydrogen gas (H_2) is highly flammable and will burn in air at a very wide range of concentrations between 4 percent and 75 percent by volume. The enthalpy of combustion for hydrogen is -286 kJ/mol, and is described by the equation:

[latex]2 H_2(g) + O_2(g) \rightarrow 2 H_2O(l) + 572 kJ (286 kJ/mol H_2)[/latex]

Hydrogen gas can also explode in a mixture of chlorine (from 5 to 95 percent). These mixtures can explode in response to a spark, heat, or even sunlight. The hydrogen autoignition temperature (the temperature at which spontaneous combustion will occur) is 500 °C. Pure hydrogen-oxygen flames emit ultraviolet light and are invisible to the naked eye. As such, the detection of a burning hydrogen leak is dangerous and requires a flame detector. Because hydrogen is buoyant in air, hydrogen flames ascend rapidly and cause less damage than hydrocarbon fires. H_2 reacts with oxidizing elements, which in turn react spontaneously and violently with chlorine and fluorine to form the corresponding hydrogen halides.

H_2 does form compounds with most elements despite its stability. When participating in reactions, hydrogen can have a partial positive charge when reacting with more electronegative elements such as the halogens or oxygen, but it can have a partial negative charge when reacting with more

electropositive elements such as the alkali metals. When hydrogen bonds with fluorine, oxygen, or nitrogen, it can participate in a form of medium-strength noncovalent (intermolecular) bonding called hydrogen bonding, which is critical to the stability of many biological molecules. Compounds that have hydrogen bonding with metals and metalloids are known as *hydrides*.
Oxidation of hydrogen removes its electron and yields the H^+ion. Often, the H^+ in aqueous solutions is referred to as the hydronium ion (H_3O^+). This species is essential in acid-base chemistry.

Hydrogen Isotopes

Hydrogen naturally exists as three isotopes, denoted ^1H, ^2H, and ^3H. ^1H occurs at 99.98 percent abundance and has the formal name protium. ^2H is known as deuterium and contains one electron, one proton, and one neutron (mass number = 2). Deuterium and its compounds are used as non-radioactive labels in chemical experiments and in solvents for ^1H-NMR spectroscopy. ^3H is known as tritium and contains one proton, two neutrons, and one electron (mass number = 3). It is radioactive and decays into helium-3 through beta decay with a half-life of 12.32 years.

Exercises

1. Answer the following questions.
    1. Which is the most abundant element in the universe?
    2. Which isotope of hydrogen is radioactive?
    3. Does H_2 form compounds with most elements?
    4. When can hydrogen gas explode?
    5. What are hydrogen isotopes?
    6. When can hydrogen participate in a form of medium-strength noncovalent bonding called hydrogen bonding?
    7. How can you describe hydrogen?

II. Fill in the correct form of the verb given: Present Tense Simple or Progressive

1. _____ fishing with me on Sunday? – I don't know. I'll think about it. (YOU GO) 2.I _____ here as a waiter on weekends. (WORK) 3. Max _____ to be a nice student. Let's see how he _____ in class. (APPEAR, HE DO) 4. I _____ what this letter means. It _____ no sense. (NOT UNDERSTAND, MAKE) 5.I _____ the dog for a walk because it's so sunny outside. (TAKE) 6. _____ at night? (YOU EVER DREAM) 7.I _____ on you to help me organise the meeting. (COUNT) 8.My sister _____ a video conference in her company next week. (HOLD) 9.Why _____ to what he has to say. (YOU NOT EVER LISTEN) 10.I _____ meat. I'm a vegetarian. (NOT EAT).

III. Complete the sentences with the superlative form of the adjectives and adverbs in parentheses. Use least if not is included in the parentheses.

1. Kelly: I think people are too concerned about having (1) the most modern (modern) cell phones. Cell phones contain some of (2) (rare) minerals on Earth, but many people just throw their old cell phones away when they buy a new one. This is (3) (one of the / bad / thing) you can do! But if you recycle your old cell phones, it's (4) (one of the / good / thing) you can do. 2. Amir: My cell phone is (5) (important / thing) I own. It's (6) (convenient / place) I have to keep information. 3. Brad: My new cell phone is a piece of junk! It was (7) (not expensive) phone in the store. What a mistake! Also, the salesperson in that store was one of (8) (not helpful / salesperson) I've ever spoken to.

IV. *Suggestions for Composition Exercises (5-10 sentences each):*

1) Conserving water.
2) A person can live about a month without food, but only about a week without water.
3) The Sahara Desert.
4) The impacts of water compositions on sensory properties of foods and beverages.
5) How to stop wasting water.

Translate into Ukrainian. Put 10 questions to the text.

RICKETS

Rickets is a softening of bones in children potentially leading to fractures and deformity. Rickets is among the most frequent childhood diseases in many developing countries. The predominant cause is a vitamin D deficiency, but lack of adequate calcium in the diet may also lead to rickets (due to this deficiency, cases of severe diarrhoea and vomiting may occur). Although it can occur in adults, the majority of cases occur in children suffering from severe malnutrition, usually resulting from famine or starvation during the early stages of childhood. Osteomalacia is the term used to describe a similar condition occurring in adults, generally due to a deficiency of vitamin D. The origin of the word "rickets" is probably from the Old English dialect word 'wrickken', to twist. The Greek derived word "rachitis" (meaning "inflammation of the spine") was later adopted as the scientific term for rickets, due chiefly to the words' similarity in sound.

Epidemiology

Those at higher risk for developing rickets include:

- Breast-fed infants whose mothers are not exposed to sunlight
- Breast-fed infants who are not exposed to sunlight
- Individuals not consuming fortified milk, such as those who are lactose intolerant

Individuals with red hair have been speculated to have a decreased risk for rickets due to their greater production of vitamin D in sunlight.

Etiology

Vitamin D is required for proper calcium absorption from the gut. In the absence of vitamin D, dietary calcium is not properly absorbed, resulting in hypocalcemia, leading to skeletal and dental deformities and neuromuscular symptoms, e.g. hyperexcitability.

Signs and symptoms of rickets include:

- bone pain or tenderness;
- dental problems;
- muscle weakness (rickety myopathy or "floppy baby syndrome");
- increased tendency for fractures (easily broken bones), skeletal deformity (cranial, spinal, and pelvic deformities);
- growth disturbance;
- hypocalcemia (low level of calcium in the blood);
- tetany (uncontrolled muscle spasms all over the body);
- craniotabes (soft skull).

Long-term consequences include permanent bends or disfiguration of the long bones, and a curved back.

Diagnosis

A doctor may diagnose rickets by:

- Blood tests:
- Serum calcium may show low levels of calcium, serum phosphorus may be low, and serum alkaline phosphatase may be high.
- Arterial blood gases may reveal metabolic acidosis.
- X-rays of affected bones may show loss of calcium from bones or changes in the shape or structure of the bones.
- Bone biopsy is rarely performed but will confirm rickets.

Treatment and prevention

Treatment involves increasing dietary intake of HGH, phosphates and vitamin D. Exposure to ultraviolet B light (sunshine when the sun is highest in the sky), cod liver oil, halibut-liver oil, and viosterol are all sources of vitamin D.

A sufficient amount of ultraviolet B light in sunlight each day and adequate supplies of calcium and phosphorus in the diet can prevent rickets. Darker-skinned babies need to be exposed longer to the ultraviolet rays. The replacement of vitamin D has been proven to correct rickets using these methods of ultraviolet light therapy and medicine.

Recommendations are for 400 international units (IU) of vitamin D a day for infants and children. Children who do not get adequate amounts of vitamin D are at increased risk of rickets. Vitamin D is essential for allowing the body to uptake calcium for use in proper bone calcification and maintenance.

Supplementation

Sufficient vitamin D levels can also be achieved through dietary supplementation. Vitamin D3 (cholecalciferol) is the preferred form since it is more readily absorbed than vitamin D2. Most dermatologists recommend vitamin D supplementation as an alternative to unprotected ultraviolet exposure due to the increased risk of skin cancer associated with sun exposure.

Infants who are breast-fed may not get enough vitamin D from breast milk alone. For this reason, infants who are exclusively breast-fed should receive daily supplements of vitamin D from age 2 months until they start drinking at least 17 ounces of vitamin D-fortified milk or formula a day. This requirement for supplemental vitamin D is not a defect in the evolution of human breastmilk but is instead a result of the modern-day infant's decreased exposure to sunlight.

КОНТРОЛЬНА РОБОТА №54

Translate into Ukrainian

Inorganic Acids

An inorganic acid is a compound of hydrogen and one or more other element (with the exception of carbon) that dissociates or breaks down to produce hydrogen ions when dissolved in water or other solvents. The resultant solution has certain characteristics such as the ability to neutralize bases, turn litmus paper red and produce specific colour changes with certain other indicators. Inorganic acids are often termed mineral acids. The anhydrous form may be gaseous or solid.

Inorganic acids are used as chemical intermediates and catalysts in chemical reactions. They are found in a variety of industries, including metal- and woodworking, textile, dyestuff, petroleum and photography. In metalworking, they are often used as cleaning agents before welding, plating or painting. *Sulphamic acid*, *sulphuric acid* and hydrochloric acid are used in electroplating, and *perchloric acid* is used in metal plating.

Hydrochloric acid, sulphuric acid, perchloric acid and sulphamic acid are widely used in industry. Hydrochloric acid, or hydrogen chloride in aqueous solution, is used for industrial acidizing, for refining ores of tin and tantalum, for converting cornstarch to syrup, and removing scale from boilers and heat-exchange equipment. It is also a tanning agent in the leather industry. *Sulphuric acid* is used in parchment paper and in various processes including purification of petroleum, refining vegetable oil, carbonization of wool fabrics, extraction of uranium from pitchblende, and iron and steel pickling. Sulphuric acid and perchloric acid are used in the explosives industry. Sulphamic acid is a flame retardant in the wood and textile industries and a bleaching agent and bactericide in the pulp and paper industry. It is also used for chlorine stabilization in swimming pools.

Nitric acid is used in the manufacture of ammonium nitrate for fertilizer and explosives. In addition, it is used in organic synthesis, metallurgy, ore flotation, and for reprocessing spent nuclear fuel.

Health effects. The inorganic acids are corrosive, especially in high concentrations; they will destroy body tissue and cause chemical burns when in contact with the skin and mucous membranes. In particular, the danger of eye accidents is pronounced. Inorganic acid vapours or mists are respiratory tract and mucous membrane irritants, although the degree of irritation depends to a large degree on the concentration; discolouration or erosion of the teeth may also occur in exposed workers. Repeated skin contact may lead to dermatitis. Accidental ingestion of concentrated inorganic acids will result in severe irritation of the throat and stomach, and destruction of the tissue of internal organs, perhaps with fatal outcome, when immediate remedial action is not taken. Certain inorganic acids may also act as systemic poisons.

Wherever possible, highly corrosive acids should be replaced by acids which present less hazard; it is essential to use only the minimum concentration necessary for the process. Wherever inorganic acids are used, appropriate measures should be instituted concerning storage, handling, waste disposal, ventilation, personal protection and first aid.

Storage. Avoid contact with other acids and combustible or oxidizable materials. Electrical installations should also be of the acid-resistant type.

Storage areas should be separated from other premises, well ventilated, sheltered from sunlight and sources of heat; they should have a cement floor and contain no substances with which an acid might

react. Large stocks should be surrounded by kerbs or sills to retain the acid in the event of leakage, and provisions for neutralization should be made. A fire hydrant and a supply of self-contained respiratory protective equipment for emergency or rescue purposes should be provided outside the storage premises. Spillages should be dealt with immediately by hosing down; in the event of a large leakage, personnel should vacate the premises and then, having donned emergency equipment, return to neutralize the acid with water or calcined sand. Electrical equipment should be of the waterproof type and resistant to acid attack. Safety lighting is desirable.

Containers should be kept tightly closed and should be clearly labelled to indicate the contents. Decompression measures should be taken where necessary. Piping, couplings, gaskets and valves should all be made of material resistant to nitric acid. Glass or plastic containers should be adequately protected against impact; they should be kept off the floor to facilitate flushing in the event of leakage. Drums should be stored on cradles or racks and chocked in position. Gas cylinders of gaseous anhydrous acid should be stored upright with the cap in place. Empty and full containers should preferably be stored apart. Maintenance and good housekeeping are essential.

Exercises

I. Answer the questions.

1. What is an inorganic acid?
2. Where are inorganic acids found?
3. Which acids are widely used in industry?
4. How is hydrochloric acid used?
5. Where is sulphuric acid used?
6. Where should inorganic acids be stored?
7. What are the storage conditions?

II. Fill in the gaps with proper prepositions.

Wherever possible acids should be pumped through sealed systems to prevent all danger ____ contact. Where acids are mixed ___ other chemicals or water, workers must be fully aware ____ any violent or dangerous reaction that may take place. ___ example, a concentrated acid should be slowly added ____ water, rather than vice versa, in order to avoid the generation ____ excessive heat and violent reactions which can cause splashes and skin or eye contact.

Persons exposed ____ dangerous splashes ____ inorganic acids should be required to wear acid-resistant personal protective equipment including hand and arm protection, eye and face protection and aprons, overalls or coats. Provided safe working procedures are adopted, the use ____ respiratory protective equipment should not be necessary; however, it should be available ____ emergency use.

III. Fill in the correct form of the present tense.

1. They normally _____ a coffee break at ten, but today there's a lot of work to do so they _____ one. (HAVE, NOT HAVE) 2. Why _____ my coat? – I'm sorry. – It _____ just like mine. (YOU WEAR, LOOK) 3. _____ the men in black suits over there? – They _____ at us in a strange way. (YOU SEE, LOOK) 4. The food _____ chemicals that make it last longer. (CONTAIN) 5. It _____ the moon about 28 days to travel around the earth. (TAKE) 6. Everything in this box _____ to my grandfather. He _____ it to me instead of my brother. (BELONG, GIVE) 7. Mary _____ through a very difficult period at university this year.

(GO) 8. Dad _____ everything about airplanes. He always _____ books about aviation. (KNOW, READ) 9. I used to play football in school but now I _____ rugby. (PREFER) 10.Hi Dan! – What _____ to do this evening? – Well, I _____ to a concert with a few friends and after that we _____ a good meal at a fine restaurant. (YOU PLAN, GO, HAVE)

IV. *Suggestions for Composition Exercises (5-10 sentences each):*
1. Inorganic chemistry and industry.
2. The importance of chemistry for the students of pharmacy
3. Chemistry in the Middle Ages.
4. Progress in chemistry and consequences.
5. A day in a chemical laboratory.

Translate into Ukrainian. Put 10 questions to the text.

INFERTILITY

Infertility is diagnosed after a full year of sexual intercourse without contraception. Infertility affects both men and women in equal numbers. Approximately one-third of infertility cases can be attributed to the male partner, and about one-third to the female partner. For the remaining couples, infertility is believed to be caused by problems with both partners. However, not all cases of infertility can be explained medically.

Fertility depends on several factors:

- Production of healthy sperm;
- Production of healthy eggs;
- Unblocked Fallopian tubes;
- Ability of the sperm to penetrate and fertilize the egg;
- Ability of the fertilized egg to implant itself in the uterine wall;
- Sufficient embryo quality to ensure a successful pregnancy.

An egg is able to be fertilized for approximately 24 hours after ovulation. It is released into the abdominal cavity, then enters the fallopian tube and begins its journey toward the uterus. Sperm can survive for two to four days after being released into the female reproductive tract. The encounter with the egg will take place in the upper third of the fallopian tube. The fertilized egg immediately begins undergoing a series of cell divisions; when it implants in the uterine wall about a week later, it consists of a multicell embryo.

Causes. Infertility rates have increased in recent years due to the increase in sexually transmitted disease and the accompanying rise in pelvis inflammatory disease. The trend toward delayed childbearing is also responsible, as fertility decreases significantly with age. Women aged 35 to 44 are twice as likely to be infertile as women between the ages of 30 and 34.

Other factors, such as cigarette smoking, use of recreational drugs, and exposure to occupational and environmental hazards can affect fertility in both men and women. Some women experience temporary infertility if their body-fat level falls below a certain percentage, causing them to stop ovulating. Conditions such as endometriosis, uterine polyps, and fibroids can all interfere with

conception and implantation. 10 to 30 percent of infertility cases have more than one cause. Thus, even if a specific problem is detected relatively early, further testing is usually done.

Male Infertility. The most common male infertility factors involve sperm production. A normal sample of semen contains between 400 million and 600 million sperm. Azoospermia refers to the absence of any sperm cells. Sometimes sperm are produced, but their number is too low to ensure fertilization. Although only one sperm can possibly fertilize an egg, a large number of sperm is generally needed to guarantee the egg will be fertilized. Most of the sperm released will not reach the final destination, as the journey is long and rigorous. The mobility of the sperm is also a factor in achieving fertilization.

Diagnosis and Treatment. Sperm analysis is one of the first tests done when a couple is unable to conceive. A semen sample is obtained and assessed regarding the volume, number, mobility, and shape of the sperm. A problem with the quantity or quality of sperm is usually caused by low hormone levels, injuries, infection, or a (reversible) reaction to a prescription drug. Sometimes, the remedy involves avoiding tight underwear or hot tubs, as sperm require a lower temperature to develop properly (which is why the testicles are located in the scrotum outside the abdomen). An enlarged vein in the scrotum (variocele) that impairs fertility can be easily corrected with surgery.

If the problem is a low sperm count, artificial insemination is an option, especially with "washed sperm" in which only the most active sperm have been selected for use. If there are no sperm or they are not viable, donor sperm is an option.

Female Infertility. The most common female infertility factor is an ovulation disorder. Other causes include blocked fallopian tubes, congenital abnormalities involving the uterus, and hormonal imbalances.

Diagnosis and Treatment. Failure to ovulate accounts for 20 percent of all female infertility problems. A woman can determine the date of ovulation by checking her resting (basal) body temperature throughout the month. Ovulation can then be confirmed with tests that measure the progesterone levels in the bloodstream, which peak about a week after ovulation.

If ovulation is not occurring, a number of drugs can be administered to induce ovulation, such as Clomid (clomiphene) or Pergonal (human menopausal gonadotropin). Usually a woman is started off with a relatively low dose and with each cycle is given a progressively larger dose until ovulation occurs. Side effects of these drugs include ovarian hyperstimulation syndrome, in which the ovaries become enlarged.

Damaged or blocked fallopian tubes account for 30 percent of infertility cases. The blockage may be due to adhesions or scar tissue. The test that determines if there is a blockage (and also shows the shape of the interior of the uterus) is known as a hysterosalpinogram. Surgery can attempt to clear the tubes of any obstruction, although the success rate is low. A woman with damaged tubes may be a candidate for in vitro fertilization.

Cervical factors such as the thickness and quality of the cervical mucus can also contribute to infertility. The amount and quality of the mucus normally varies during the cycle, becoming thinner, clearer, and more copious around ovulation. If the mucus is scant, too thick, or too dry, the sperm will not be able to travel through it on their way to the egg.

Unexplained infertility occurs in about 20 percent of all cases.

Treatment of infertility depends on the underlying cause. In 90 percent of all cases, the treatment involves medication or surgery. In vitro fertilization (IVF), gamete intrafallopian transfer (GIFT), and zygote intrafallopian transfer (ZIFT) all involve stimulating the ovaries to produce multiple mature eggs and then retrieving them.

In IVF, fertilization takes place in a laboratory. After 40 hours the embryos are transferred to the uterus. In GIFT, the sperm and eggs are placed together inside the fallopian tubes, where fertilization will take place. In ZIFT, fertilized eggs, which have already undergone a few cell divisions, are placed directly in the fallopian tubes.

In all of these procedures, which account for only five percent of all fertility treatments, multiple births are very likely to result, as more than one egg or embryo is transferred to increase the chances of pregnancy. Each attempt takes at least ten days and is quite costly. The risks include ovarian rupture, bleeding, and ectopic pregnancy. The success rates depend on where the procedure is performed; more experienced clinics and practitioners tend to have higher success rates.

КОНТРОЛЬНА РОБОТА №55

Translate into Ukrainian

Essential Amino Acids

Amino acids, often referred to as the building blocks of proteins, are compounds that play many critical roles in your body. Amino acids are organic compounds composed of nitrogen, carbon, hydrogen and oxygen, along with a variable side chain group.

Your body needs 20 different amino acids to grow and function properly. Though all 20 of these are important for your health, only nine amino acids are classified as essential.

These are histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine. The best sources of essential amino acids are animal proteins like meat, eggs and poultry.

There are several nonessential amino acids that are classified as conditionally essential. These are considered to be essential only under specific circumstances such as illness or stress. For example, although arginine is considered nonessential, your body can't meet demands when fighting certain diseases like cancer.

The nine essential amino acids perform a number of important and varied jobs in your body:

1. **Phenylalanine:** Phenylalanine is a precursor for the neurotransmitters tyrosine, dopamine, epinephrine and norepinephrine. It plays an integral role in the structure and function of proteins and enzymes and the production of other amino acids.
2. **Valine:** Valine is one of three branched-chain amino acids, meaning it has a chain branching off to one side of its molecular structure. Valine helps stimulate muscle growth and regeneration and is involved in energy production.
3. **Threonine:** Threonine is a principal part of structural proteins such as collagen and elastin, which are important components of the skin and connective tissue. It also plays a role in fat metabolism and immune function.
4. **Tryptophan:** Though often associated with causing drowsiness, tryptophan has many other functions. It's needed to maintain proper nitrogen balance and is a precursor to serotonin, a neurotransmitter that regulates your appetite, sleep and mood.
5. **Methionine:** Methionine plays an important role in metabolism and detoxification. It's also necessary for tissue growth and the absorption of zinc and selenium, minerals that are vital to your health.
6. **Leucine:** Like valine, leucine is a branched-chain amino acid that is critical for protein synthesis and muscle repair. It also helps regulate blood sugar levels, stimulates wound healing and produces growth hormones.
7. **Isoleucine:** The last of the three branched-chain amino acids, isoleucine is involved in muscle metabolism and is heavily concentrated in muscle tissue. It's also important for immune function, hemoglobin production and energy regulation.
8. **Lysine:** Lysine plays major roles in protein synthesis, hormone and enzyme production and the absorption of calcium. It's also important for energy production, immune function and the production of collagen and elastin.
9. **Histidine:** Histidine is used to produce histamine, a neurotransmitter that is vital to immune response, digestion, sexual function and sleep-wake cycles. It's critical for maintaining the myelin sheath, a protective barrier that surrounds your nerve cells.

Both animal and plant proteins are made up of about 20 common amino acids. The proportion of these amino acids varies as a characteristic of a given protein, but all food proteins—with the exception of gelatin—contain some of each. Amino nitrogen accounts for approximately 16% of the

weight of proteins. Amino acids are required for the synthesis of body protein and other important nitrogen-containing compounds, such as creatine, peptide hormones, and some neurotransmitters. Although allowances are expressed as protein,[a] the biological requirement is for amino acids.

Proteins and other nitrogenous compounds are being degraded and resynthesized continuously. Several times more protein is turned over daily within the body than is ordinarily consumed, indicating that reutilization of amino acids is a major feature of the economy of protein metabolism. This process of recapture is not completely efficient, and some amino acids are lost by oxidative catabolism. Metabolic products of amino acids (urea, creatinine, uric acid, and other nitrogenous products) are excreted in the urine; nitrogen is also lost in feces, sweat, and other body secretions and in sloughed skin, hair, and nails. A continuous supply of dietary amino acids is required to replace these losses, even after growth has ceased.

Exercises

Exercise 1. Answer the following questions.

1. What are amino acids?
2. Which amino acids are essential?
3. What are the best sources of amino acids?
4. Which acids are conditionally essential?
5. What are the roles of amino acids in the human body?
6. Why can amino acid deficiencies negatively impact your entire body?

II. Fill in the correct form of the present tense.

1. What _____ for a living? – Well, he's a lawyer but he quit his old job and at the moment he _____ for a new one. (YOUR DAD DO, LOOK) 2.You _____ shopping every Saturday. – Why _____ that? (GO, YOU DO) 3.I _____ absolutely no idea what this movie is about. (HAVE) 4.The two department managers _____ lunch at the moment. We shouldn't disturb them. (HAVE) 5.Teachers _____ us homework every day, but this weekend they _____ us any because of the mid-term break. (GIVE, NOT GIVE) 6.Where _____ from? I think they _____ from Jamaica, but I'm not sure. (NEW NEIGHBOURS COME, BE) 7.The air _____ strange. There must be something going on in the factory. (SMELL) 8.I can't listen to what you _____ to tell me because I'm so nervous at the moment. (TRY)

III. *Suggestions for .Composition Exercises (5-10 sentences each):*

1. A visit in a vinegar factory.
2. Citrus fruits.
3. Chemists in perfume industry.
4. Ordinary soap and sea-water.
5. The fragrance in an orchard...

IV.Fill in blanks with appropriate prepositions.

Though amino acids are most recognized for their role ___ muscle development and repair, the body depends ____ them for so much more.

That’s why essential deficiencies ___ amino acid can negatively impact your entire body including your nervous, reproductive, immune and digestive systems.

There are nine essential amino acids, which you must get ___ your diet: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine.

They're vital ___ functions such as protein synthesis, tissue repair and nutrient absorption.

Some may also prevent muscle loss and improve mood, sleep, athletic performance and and loss ___ weight.

Fortunately, these vital compounds are found ___ many animal- and plant-based foods, helping you meet your daily needs through a healthy and balanced diet.

Translate into Ukrainian. Put 10 questions to the text.

BREAST CANCER

Breast cancer is the most common cancer among women. One out of every 14 women will develop breast cancer, and one of every 20 will die of it. Men can also develop breast cancer, although it is rare; less than one percent of all breast cancer cases occur in men. The incidence of breast cancer increased steadily starting in the 1970s. Many experts believe the increase was due to earlier detection through self-examination and x-ray examination of the breast (mammography). Lending support to that view is a steady increase in the survival rate for breast cancer patients, an indication that the malignancy is being detected in its earlier, more treatable stages.

Estrogen, the female sex hormone produced by the ovaries plays an important role in the growth and spread of breast cancer. The precise effects of estrogen on breast tissue are, however, still unclear. Women who experience prolonged exposure to estrogen – because they started menstruating at an early age, had children after the age of 30, or had a later menopause – have a higher incidence of breast cancer.

Antiestrogen drugs, such as tamoxifene and raloxifene, block the effect of estrogen on breast tissue and are widely used in treatment and prevention, but the major risk factor for breast cancer is age. A 60-year-old woman is 14 times more likely to develop breast cancer than a 30-year-old woman. The risk increases for any woman with a first-degree relative – sister, mother, or daughter – who has had the disease. Obesity also increases risk, because fat cells convert estrogen to estradiol, a more powerful version of the hormone. A woman who has had cancer in one breast has at least a threefold increased risk of developing it in the other breast.

Symptoms.

The symptoms of breast cancer start with a change in the physical appearance of the breast – an alteration in size or shape, a lump in or near the breast or under the arm, or an ulcer or other lesion of a nipple. Irritation of the skin on a breast, a swollen and reddened breast, and persistent pain in the breast may also be indicators of an underlying cancer.

When breast cancer is suspected, diagnostic measures include a small tissue sample taken either through a fine needle, or a large tissue sample (biopsy). The biopsy sample may be tested for the presence of receptors for estrogen and progesterone. Surgical examination of the axilla (armpit) is an essential part of the evaluation of breast cancer. If such receptors are found, drugs that block the growth-stimulating effects of those hormones may be prescribed.

Treatment.

The treatment of breast cancer depends in large part on the stage at which it is detected, but many

other factors are involved: the hormone sensitivity of the cancer, the woman's age and menopausal status, her family history, and her general health.

For a small, early-stage cancer that has not spread beyond the breast, breast-conserving surgery such as a lumpectomy followed by radiation therapy may be sufficient. Larger cancers may require mastectomy – removal of the entire breast. Post-operative treatment with hormones or chemotherapy is often prescribed to prevent the spread of tumour cells.

Several drug combinations are routinely used, while others are being tested. One in current clinical use combines cyclophosphamide, methotrexate and fluorouracil. Doxorubicin and taxol are also often used. The types of drugs that are prescribed and the length of time over which they are given vary widely, depending on individual circumstances. Tamoxifene and other drugs block the effects of the estrogen hormone and may be helpful in prevention and treatment of breast cancer.

Prognosis.

After treatment, a woman may be placed on continuing tamoxifene treatment to prevent recurrence of the cancer. The drug does increase the risk of endometrial cancer slightly, but its benefits are believed to far outweigh that risk. Tamoxifene therapy is continued for no more than five years, since no benefit has been demonstrated for a longer period of treatment.

The field of breast cancer treatment is still changing. Despite ongoing clinical trials, controversies still arise over the value of different treatment combinations and how to use them. Early detection remains essential for the best results. The five-year survival rate for a woman whose breast cancer is detected at the earliest stage is over 95 percent, compared to about 10 percent for a cancer detected much later. Overall, the five-year survival rate for all breast cancer patients is over 83 percent.

Mammography.

Mammography is a screening technique for early detection of breast cancer. The procedure is painless and requires the use of low-level x-rays to examine breast tissue for possible signs of malignancy.

Many physicians recommend regular mammogram tests for women after age 40. Between the ages of 35 and 40, women are encouraged to have a mammogram to help establish a baseline to evaluate later examinations. Detection of an abnormality may be followed up with a variety of further tests, including ultrasound, thermography, and removal of tissue for analysis (biopsy).

High-Risk. Women belonging to high-risk groups should maintain strict vigilance against breast cancer through frequent self-examination and regular mammography. High-risk groups include women who have first-degree relatives with cancer, are of African-American descent, over 50, and those who give birth after the age of 30.

Procedure. The x-ray equipment used for mammography is specifically designed for examination of the breasts, which are examined individually. The procedure is noninvasive, and the radiation dose is not believed to pose significant long-term health risks. The technique of mammography involves compressing the breast between a film plate and a special paddle, which helps record an accurate reading onto a slider that is very similar to an x-ray or photonegative. Normal breasts appear in the slider as dark grey, with white areas corresponding to glandular and fibrous tissue.

Efficacy. Mammography can reduce breast cancer deaths by 25 to 35 percent among women who have the examination at one and two year intervals. However, mammography should serve to

supplement regular breast self-examinations, which should be performed once a month on the same day, preferably several days following menstruation, when menstrual hormones are less active. Self-examination may be performed at home and is an ideal preventative method for detecting lumps or irregularities of the breast.