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Английский язык для студентов специальности "Фармация"

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АНГЛИЙСКИЙ ЯЗЫК ДЛЯ СТУДЕНТОВ СПЕЦИАЛЬНОСТИ "ФАРМАЦИЯ"

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Учебное пособие предназначено для студентов 1 и 2 курса специальности «Фармация». Основной акцент сделан на развитие профессиональных коммуникативных компетенций, способность устанавливать и поддерживать необходимые контакты с коллегами и пациентами для выполнения профессиональных задач. Также может использоваться как факультативный курс «Английский язык в сфере профессионального общения» для старших курсов.

Пособие включает в себя разделы по Истории Фармации, Химии, Фармацевтической химии и технологии, Фармакогнозии, Управлению и Экономике Фармации. Раздел Additional Reading (Тексты для дополнительного чтения) содержит тексты о всемирно известных ученых, уникальных лекарственных растениях, а также рецепты (сборы лекарственных растений) Китайской традиционной медицины.

Содержание

Unit 1. Pharmacy in General

***Key words**: pharmacy, pharmaceutical, pharmacist, pharmacologist, pharmacokinetics, pharmacodynamics; drug, drugstore; medicine*

Ex. 1. Think about the associations with the "alpha and omega" of Pharmacy.

Ex. 2. Name the subdivisions of Pharmacy, matching the words each other.

a.	Pharmaceutical	k.	affairs
b.	Pharmacological	l.	kinetics
c.	Regulatory	m	assurance
d.	Pharmaco	n.	production
e.	Medicinal	o.	chemistry
f.	Quality	p.	pharmacy
g.	Molecular	r.	chemistry
h.	Clinical	s.	affairs
i.	Toxicological	t.	research & development
j.	Industrial	u.	economics & management

Ex. 3. Key words for reading:

biology, biological, biologist, antibiotics, probiotics; chemistry, chemical, chemist, chemotherapy; pharmacy, pharmaceutical, pharmacist, pharmacologist, pharmacokinetics, pharmacodynamics; drug, drugstore; medicine, medical, medicinal.

Ex. 4. Read the text " History of Pharmacy in brief"

PART 1

It is known, that the primitive people applied medicinal plants in 70-44 years B.C.E., it was the period of collection in the history of human development. They used centaurium, yarrow, sweatweed, ephedra, cress-leaved groundsel etc.

The term "pharmacy" originated from Greek word "farmakeia" – appliance of drugs. The inscription "farmakeia" was found under the image of Thoth, the Egyptian god of wisdom, knowledge, mathematics, medicine and pharmacy.

Those, who dealt with medicine production and sale were called “pharmacists”. This term appeared in Ancient Rome in III century B.C.E. “Pharmacists” not only made drugs but treated people as well. This profession was very responsible: if a patient died on the operation table, the “medicus” hands were cut off.

The first detailed information about medicines was found on the papyrus in Ancient Egypt, in Luxor about 1 700 years B.C.E. There were 900 formulations. Egyptian doctors could prepare and use oinments, mixtures, patches, clysma. The base of medicines was milk, honey, beer, water from sacred springs, vegetable oils. The drugs contained onion, pomegranate, aloe, grapes, papyrus, lotus, dates, poppy; Minerals: soda, clay, antimony, lead, sulphur, saltpeter, iron, gypsum; and parts of animals’ body.

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The primitive people believed that the reason of diseases was demon and because of this, the sick people were given vomit - inducing drugs, using bitter herbal infusion.

Chinese medicine is considered to be one of the earliest medicine in the world. to geographical situation China has got a rich flora. Scientific books about medicinal plants had been published by II – III C.B.E. Approximately 240 plants were studied at that time. Chinese doctors applied plantain, fern, dandelion, Cannabis indica, ginger, camphora, magnolia- vine, ipecacuanha (Psychotria ipecacuanha). Ginseng root started to be applied just in V-VI C.B.E. Weeds were used for iodine deficiency, betelnut – for parasites, flowers of camellia –for burns, flowers of peach were used as diuretic, for constipation and tumors. Also, rhubarb, buds of young bamboo, garlic, resin, aconite, pepper, cloves were well-known as medicinal plants. The book “Thousand golden drugs” was published in China in 652 A.D. and the first Pharmacopoeia was appeared in

659. It consisted of 53 volumes and 844 drugs were described.

The foundation of Chinese Medicine is a system of Philosophy about five elements metal, water, fire, ground and wood of the combination of two force called yin and yang. Health is considered to be a balance, a disease - a disbalance.

The main aim of the doctors all over the world was to find elixir of life. Thereafter, Alchemy has begun its development. The achievements of alchemists are recovering of chlorhydric acid, sulphuric acid, alkali, glass, alloys, enamel and drugs. Alchemy existed up to XV century. The investigations became more accurate, scientifically based. One of the founder of scientific chemistry is considered to be British scientist Robert Boil, who published the book "Chemist –sceptic". This publication helped to divide Alchemy Chemistry.

So, Alchemy gave birth to Chemistry as a science.

Ex. 5. Work with a partner.

a) Discuss what you understand by the title of the text above.
b) What do you think you might read more about the history of Pharmacy?
c) Give some examples of names of medicinal plants and chemicals.
d) Read the whole text, then discuss the main ideas it contains.

Grammar. The Passive.

When we use the passive

- We use the passive when the action is more important than the person or thing doing the action.
- We often use the passive when the agent is unknown.
- The passive is often used in more formal situations, such as lectures, academic writing and news reports.

How to form the passive

to be + **past participle**

- The passive is usually formed by moving the object to the front of the sentences.

Because of this only transitive verbs (verbs which have an object) can become passive. We can't say *It has been happened* because *happen* is intransitive.

- Some intransitive phrasal verbs can be in passive.
  The baby woke up because of the noise. (active)
  *The baby **was woken up** by the noise. (passive)*
- When a verb has two objects. The object that is more important to the message of the sentence is generally the subject.
  The pharmacist gave the client the drug.
  *The drug **was given** to the client.*
- When the agent is important to the message.
  She ***has been awarded*** an Honorary Certificate by the President of Pharmaceutical Company.
- We can use the passive form of reporting verbs to give ideas or opinions without saying where the ideas come from. (assume, believe, claim, consider, feel, hope, report, say, think).
  *It **is said** (that) most drug users are elderly people.*
  *Covid-19 **is said** to have begun in China.*
  *Pharmacy **is thought to have emerged** in Europe 2 500 years ago.*

Ex. 6. Complete the sentences using the given forms of the verbs in passive.

a. The feasibility study _____ successfully completed.

b. As far as your input _____, we need the financial data from your department as soon as possible.

c. The soft gel capsule _____ soon afterwards by two other dosage forms also in the pipeline: patches and sugar – coated tablets.

d. New drugs _____ on live subjects.

e. Pharmaceutical dosage forms _____ by formulation scientists now.

is concerned	are tested
will be followed	has been
are being developed	

Ex. 7. Match the term on the left with the definition on the right.

1. products in the pipeline

2. feasibility study

3. prescription drug

4. dosage form

5. over-the-counter drug

DEFINITIONS:

☐ - **a** *Medicine bought in a pharmacy and requiring a written note from the doctor.*

☐ - **b** *Future drugs, not yet on the market.*

☐ - **c** *The final form of the medicine,e.g. tablet, powder, gel, spray, etc.*

☐ - **d** *An investigation to determine the advantages, practically, and profitability of a proposed project.*

☐ - **e** *A product which can be sold without the patient seeing a doctor.*

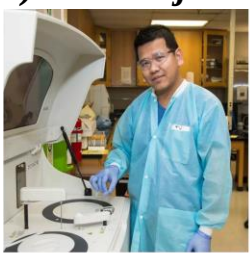
Unite 2. Keeping in touch. Job Profiles.

***Key words**: formulation scientist, laboratory technician, medical writer, packaging technician, pharmacovigilance manager, project manager, qualified person, volunteer, lawyer, clinical research associate*

Ex. 1. Match the job profiles (a-h) with the job titles (1-9).

1. formulation scientist

2. clinical research associate



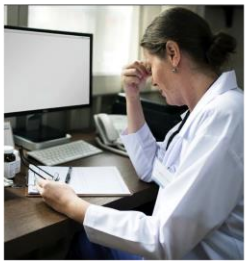
3. laboratory technician

4. qualified person

5. project manager

6. packaging technician

7. pharmacovigilance manager



8. medical writer

9. volunteer

job profiles:

☐- **a** Collecting drug safety information about patients on medications, reporting any serious adverse effects to the health authorities

☐-**b** Operating complex scientific instruments and performing tests to determine whether ingredients in drugs meet requirements

☐-**c** Researching, writing, editing clinical and study reports before submitting them to regulatory authorities, summarizing and interpreting clinical data

☐-**d** Testing drugs, close work with the doctors to make sure that the studies are done correctly

☐-**e** Cleaning containers are used to get the product from the company to the patient, checking for compliance with health regulations

☐-**f** Co-ordinating and managing the cross-functional teams that develop and launch a drug.

☐-**g** People who have come forward to offer their help and have been enrolled to take part in clinical drug trials

☐-**h** Developing pharmaceutical dosage forms, e.g. changing a tablet formulation into ointment or gel forms

☐-**i** Responsibility for the quality of each product that leaves the production line, managing all the processes in production and the labs to make sure Standard Operating Procedures (SOPs) are followed

Ex. 2. Read the letter from the border-line-student who wants to study Pharmacy in Medical University.

Dear Sir or madam,

My name is Nick Somov ,a fifth-year student of pharmaceutical faculty.

I'm from the city of Yekaterinburg and this year I'm graduating the Medical University. I'm interested in Pharmaceutical Industry and it seems I know everything about Pharmacy. However, I don't know exactly where else the pharmacist can work and what requirements I have a few questions.

First, what job profiles are there in the Pharmacy else? I'm thinking about the new drugs and new drug forms developing.

Secondly, are there such job facilities in Yekaterinburg or nearby?

Another question, are there any vacancies there and what is a salary for a beginner?

Would you like to recommend me other interesting job profiles, which I probably haven't known yet.

I look forward to hearing from you.

Yours faithfully,

Nick Somov

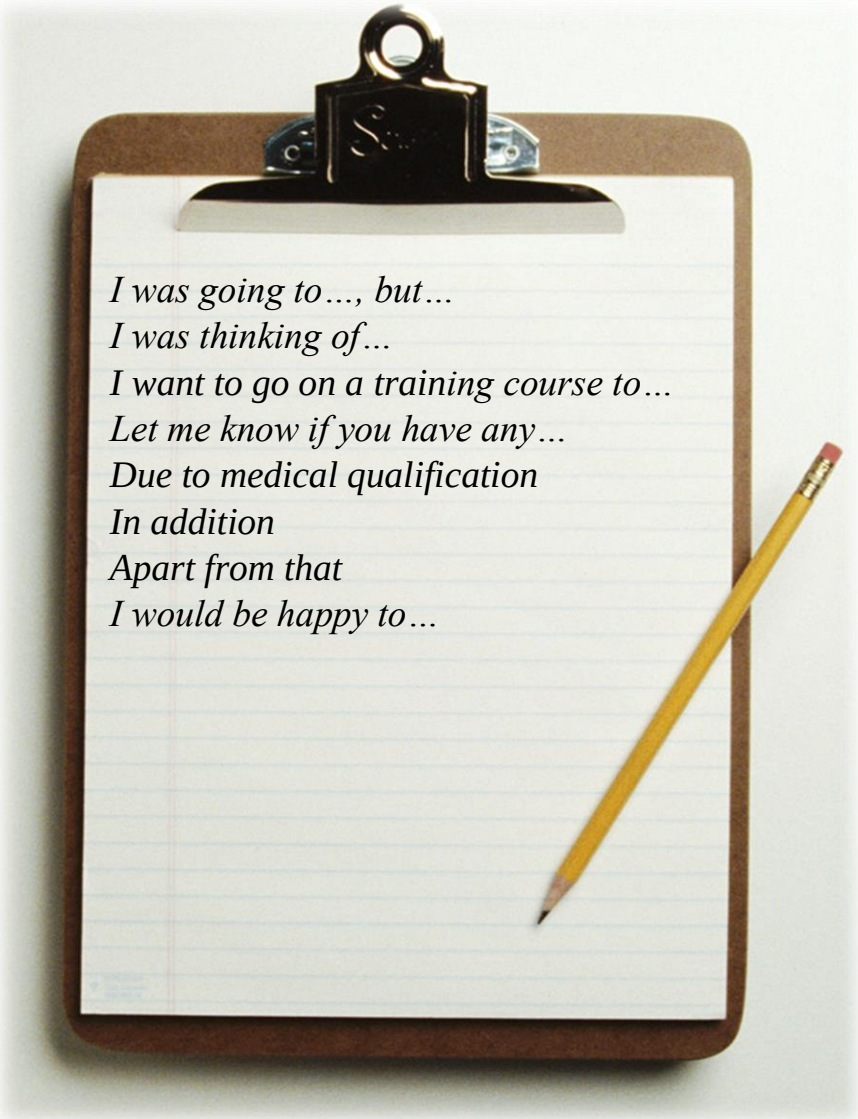
Ex. 3. Read the letter of response from "ABC" Pharmaceutical Company.

Mr. Somov,

The Pharmaceutical Company "ABC" will be very glad to tell you about all the job facilities of our company. However, you must understand that your position will depend on your academic degree. The first scientific degree future pharmacist obtain is called a bachelor's degree. After receiving this degree, the students continue their studies for several more years and get a master's degree, which usually involves research. However, before they become fully qualified, pharmacists have to take an examination to get a

licence to practice pharmacy. If a pharmacist wants to get master's degree, he or she can go on to a doctorate.
You may send your portfolio to our Managing Director, Diana Kruglova, and she will be in contact with you over the next couple of weeks.
With my best wishes,
Valery Samoilov, Executive Director, "ABC" Pharmaceutical Company

Ex. 4. Write a short e-mail letter of application (no more than 120 words), using the introductory expressions:



Ex. 5. What do we, pharmacists, do in the companies where we work?

a) We plan the promotion and distribution of drugs which will be launched, and make decisions about the packaging or tablet colour of new products.

b) We ensure that products meet the standards which the law requires, and contain the active ingredients advertised.

c) We compound the raw materials into drugs, package them, and put in the leaflets. We also keep careful records of all the steps in this process.

d) We find new substances to make new drug formulations or change existing dosage forms, for example, from tablets to capsules.

e) We compile the drug documentation and send it to the regulatory authorities so we can get authorization to market the product.

f) We test or organize testing on live subjects, and make sure that our drugs are safe and effective for the patients.

Ex. 6. Match the professional activities a-f f to the Departments of Pharmaceutical Company:

1. *The Department of Clinical Affairs*
2. *The Department of Quality Assurance*
3. *The Department of Regulatory Affairs*
4. *The Department of Research and Development*
5. *The Department of Marketing and Sales*
6. *The Department of Production*

Ex. 7. What department would you like to work in?

Ex. 8. Read the dialogue with your partner a few times. Practice your intonation and pronunciation. Write down new words and phrases.

Andrey: Good day, everyone. The aim of our meeting today is to meet each other and to discuss the new analgesic the working name ClearHead. However, before we get started on the project, I would like you to introduce yourselves and say something about your professional background. Helen, would you mind starting?

Helen: Of course not, Sergey. Well, I work in Novosibirsk. My professional background is in pharmacology and in 2015 I received my diploma and licence to practice pharmacy in Yekaterinburg. I did research on clinical methodology. I am the clinical trial manager assigned to this project. I have been with this company for about three years and I used to work at "Vektor" in their clinical department.

Sergey: Thank, Helen. Peter, could you go next?

Peter :Hi, everyone! As for my background, I got my PhD in Pharmaceutical Chemistry at the University in Munich, Germany and then work for Pharmafix and the I left there to join this company. I am the formulation scientist whose team developed the soft capsule for this project. Now we are working on the other two dosage forms.

Sergey: Thanks, Peter, and now, Oleg, could you…?

Oleg: Hi, pleased to meet you all. A am based at our manufacturing plant in Perm and was born and raised there. I studied at the Engineering Academy. Recently, I was involved in the initial conceptual design phase, the planning and building of our new pharmaceutical facility in Norilsk, and now I am a plant manager. At this facility we produce both liquid and solid dosage forms. At the moment I am working on a project to a new analgesics production line, so, that is why I was asked to join this project.

Ex. 9. Put information about yourself in the form below. Introduce yourself to the group using useful phrases below.

Sample Application Form

Application for Employment
An Equal Opportunity Employer*

Today's Date_____

Personal Information — Please Print or Type

Name (Last)	(First)	(Full Middle Name)		Social Security Number
Current Address	City	State	Zip Code	Phone Number ( )
What position are you applying for?		Date available for employment?		e-mail address
Are you willing to relocate? ☐ Yes ☐ No	Are you willing to travel if required? ☐ Yes ☐ No	Any restrictions on hours, weekends, or overtime? If yes, explain.		
Have you ever been employed by this Company or any of its subsidiaries before? ☐ Yes ☐ No		Indicate Location and Dates		
Can you, after employment, submit verification of your legal right to work in the United States? ☐ Yes ☐ No		Have you ever been convicted of a felony? ☐ Yes ☐ No	Convictions will not automatically disqualify job candidates. The seriousness of the crime and date of conviction will be considered.	

Performance of Job Functions

Are you able to perform all the functions of the job for which you are applying, with or without accommodation?
☐ Yes, without accommodation ☐ Yes, with accommodation ☐ No

If you indicated you can perform all the functions with an accommodation, please explain how you would perform the tasks and with what accommodation.

Name:

Nationality:

Educational background:

Work experience:

Current position:

Responsibilities:

Current tasks:

Introducing yourself

I'm from…

I've been with the company for… months (years).

I'm based at …(name of company / institute) in …(city)

Educational background:

My professional background is in …(field)

I got/ received/obtained my… (degree) in …(subject).

Work experience:

I then worked for…(company, institute) and later for …(company, institute).

I started as a (position) and worked my way up to …(position).

I did research on…

Current work and role in project:

I am the…(position) assigned to this project.

I am responsible for…

I am supported by two …(positions).

We are currently working on…

At the moment, I am working on a project to…

Ex. 10. Use the Useful Phrases above to fill in the gaps

Hi, pleased to meet you all. 1 *Oleg Davydov, and* 2 *plant manager at our plant in Perm. I was born and raised there. I first* 3 *line worker and* 4 *to packaging technician. Later, I studied at the Engineering Academy and* 5 *a diploma in Engineering there. Recently, I* 6 *in the initial conceptual design phase, and at present* 7 *the planning and building of our new pharmaceutical facility in Norilsk. In this new facility we will produce both liquid and solid dosage forms. In addition to this, at the moment* 8 *build a new analgesics production line, and, that is why I was asked to join this project.*

Ex. 11. Summarizing the decisions taken at the meeting.

Sergey: Before we finish, I'd like to review the action points and the deadlines to make sure each of us what to do at this stage.

Firstly, Irina from HR (Human Resources) will place job advertising (ads) in some pharmaceutical journals ***within the next two weeks*** *to look for new clinical research associates to conduct the trials in the test centers in Novosibirsk.*

Helen will work with her own writing up the requirements and description of duties.

Peter is to prepare a progress report on the development of the other dosage form by the end ***of next three weeks****.*

Monday *with an estimate of how much time they will need for their part of the project. With your input, I'll be able to finalize the timelines for planning and implementation and decide on milestones* ***before our next meeting****.*

Oleg's team will be responsible for describing the new equipment and machinery needed for the new dosage forms. He will give us a cost estimate by the end of the month.

Finally, Kirill is going to review any legal or regulatory issues that need to be addressed ***by the beginning of the next week.***

Ex. 12. Answer the following questions.

a) By what time will Sergey be able to finalize the timelines for planning and implementation and decide on milestones?

b) What will Irina be going to do within the next two weeks?

c) Kirill is going to review any illegal issues by the beginning of the next week, isn't he?

d) What is Oleg's team responsible for by the end of the month?

e) Is Peter going to develop a new form of the analgesics?

f) What points does Sergey want to review at the end of the meeting?

Ex. 13. Put the words in the right order to make sentences.

1. *clinical drug development You management in the will assist.*
2. *to write pharmaceutically and technically to be able study reports, and other research documents need You in English.*
3. *as a part of a team independently to work must You well and.*
4. *is English required excellent.*
5. *to this job essential FDA of knowledge regulations In – depth is*

Ex. 14. Try to reproduce the dialogue with your partners, change the roles.

Grammar

What is COMPLEX OBJECT and what it is used for?

Сложное дополнение или Синтаксическая структура состоит из двух частей: именной и глагольной.

Глагольная часть представляет собой инфинитив (глагол в неопределенной форме или одно из причастий).

Именная часть может быть выражена существительным, именем собственным или местоимением в Объектном падеже. В английском языке есть всего два падежа – Common Case (общий падеж) и Possessive Case (притяжательный падеж).

Существительные в Common Case не имеют окончаний и падеж соответствует Именительному падежу русского языка.

Существительные в Possessive Case имеют окончание –s после апострофа (pharmacist's uniform) и падеж соответствует Родительному падежу русского языка.

У местоимений тоже два падежа, но их принято называть Nominative Case (Именительный падеж) и Objective Case (Объектный падеж). Это название произошло от английского слова object (объект, дополнение). Таблица изменения местоимений по падежам:

Nominative Case	Objective Case
I-я	Me – меня, мне
You- ты	You – тебя, тебе
He- он	Him – его, ему
She - она	Her – ее, ей
It – он, она, оно	It – его, ему; ее, ей
We - мы	Us – нас, нам
You - вы	You – вас, вам
They - они	Them – их, им

Объектный падеж местоимений может соответствовать Винительному падежу (кого? что?) и Дательному падежу (кому? чему?), поэтому в данном

падеже местоимения в предложении могут быть в роли прямого и косвенного дополнения.

Например: My parents wanted me to be a doctor but I entered the Pharmaceutical faculty. *Мои родители хотели, чтобы я стал врачом, но я поступил на фармацевтический факультет.*

В отдельных случаях инфинитив может употребляться без частицы ***to***:

1. После глаголов чувств и восприятия to see, to hear, to feel, to notice, to watch.

I felt his heart beat irregular.

She noticed Peter walk (walking) along the Downing street.

A young mother watches her child make the first steps.

We heard clearly something burst with a rumbling sound in the chemical laboratory.

2. После глагола to make (заставлять, вынуждать) и глагола to let (позволять, давать).

Make her rewrite the last laboratory work.

Let my people go!

Особенно следует отметить конструкции с глаголом to have

have+ именная часть+причастие прошедшего времени

и глаголами-сказуемыми to want, to be going to, must

I want my teeth to be treated.

I am going to have my nose form changed.

I am going to have my hair painted.

I must have my office repaired.

Ex. 15. Translate these sentences into Russian.

1.We know oxygen to be a key factor on the Earth.

2. The pharmaceutical technologists found the decrease body temperature after taking in paracetamol.

3. I thought Jane to be seen yesterday, but they say she is away.

4. He knows the cheapest restaurant' s location to be in Moscow.

5. I wanted the taxi driver to come up nearer to my house.

6. The Biologists explained acidic water in the lakes might look pure while a healthy lake might have a cloudy water because of the plants and fish living in.

Ex. 16. Change the following sentences using the structures of Complex Object.

1. We know that the respiratory system consists of the mouth, nose, bronchi, trachea known as the windpipe.

2. It was discovered that anaerobic respiration occurs in the absence of oxygen.

3. All the students know that an alloy is a mixture of some metals that have been.

4. Those who have a car know where the process of corrosion might occur.

5. Historians supposed that the Academy of Sciences was established in 1724.

6. Nikolay Semyonov, a physicist and chemist, and a leader of nuclear weapon programme (1896-1986), found that a chain reaction is a reaction once started, continuous without further outside influence.

Unit 3. Chemistry and chemists

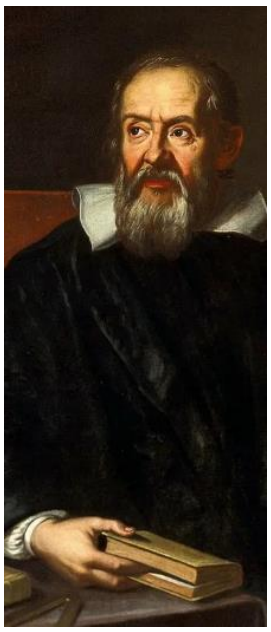
Key words: burning, substance, combine, formulate, conservation of mass, research, filling the gaps, composition, combustion, breakthrough, concern

Ex. 1. Before you read the text discuss these questions with your partner

- What famous chemists do you know?
- What are they famous for?
- Where do the chemists work?
- What equipment do they use?
- What do they work for?

Now read the following text:

The Origin of Chemistry



Chemistry began with fire. Burning changes things and ancient man must have wondered what happened to the wood he burnt. So, the iron and glass were discovered.

About 350 years ago, *Galileo Galilei* (1564-1642) change scientists' attitudes towards Science. He developed the scientific method used to obtain theories that explain how nature works. This method, which is still in use today, includes the following steps:

- ❖ Identification of the problem
- ❖ Formulation of a hypothesis based on collected and analyzed data.
- ❖ Testing of the hypothesis to check its validity.
- ❖ Development of a theory.

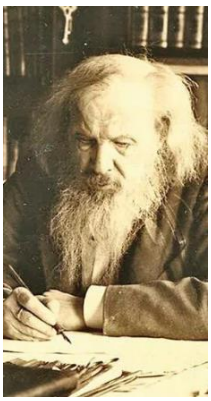
The Greek philosopher *Leucippus* (450-380 BC) founded the Atomist school. This school taught that the universe includes plurality and unity. Leucippus believed that every object was a combination of different small parts called atoms. According to him, atoms were made from three particles. This theory is still valid today.

Atoms usually have vacant spaces in their outer orbits and can accept more electrons. For example, to form H_2O, the oxygen nucleus attracts the electrons of two hydrogen atoms. The hydrogen atoms have vacant spaces too, so they share their electrons and form the molecule. This sharing of electrons to form molecules is called chemical bond. Chemical bonds result from the force of attraction between the different charges. The protons in one nucleus attract electrons from another atom. This force of attraction is called electromagnetism. It makes the atoms and the molecules combine and also keeps them together. There are uncountable combinations of atoms. For example, 4 carbon atoms combine with 10 hydrogen atoms to make up a butane molecule. A glucose molecule is made from 6 carbon atoms, 12 hydrogen atoms and 6 oxygen atoms. Cellulose, the principle molecule in the plant cell walls and also in wood,

paper, cotton and many other materials, is a chain that can include up to 12,000 glucose molecules. The different proportions and positions of the atoms produce the different forms of matter.

The origin of modern chemistry comes from the work of *Antoine Lavoisier*, a Frenchman, who was executed in 1794 during the French Revolution. He formulated the idea of the conversation of mass: substances can be changed but their quantity of mass remains the same always. Although he was the first who published his ideas but Lomonosov M.V. had come to this conclusions some years earlier.

In the 19th century British scientist John Dalton stated that all matter was made up of atoms of different elements and could not be broken down into smaller parts. A whole century had passed before Marie Curie did her work on radioactivity and Ernest Rutherford and Niels Bohr proved that Dalton was correct.



Dmitri Mendeleev took Dalton's theory of atomism and arranged the elements by their chemical properties and atomic weight. The classification of the elements was accurate, that Mendeleev was able to predict the properties of undiscovered ones to fill the gaps in the table. Mendeleev's table is one of the most useful and important generalizations of chemistry and all science.

These three developments give us the definition of chemistry. It is the science of the composition, structure and properties of substances and how they can be transformed.

Ex. 2. Complete the sentences below with the words from the box

properties	accurate	matter	concerned
combustion	broken down	quantity	arranged

1. Substances can be changed but their _____ of mass remains the same way.
2. _____ of medicinal plants have not been studied completely yet.
3. In the _____ of its chemical properties, they are not _____ yet.
4. Without oxygen there cannot be_____
5. Citizens and ecologists _____ about dangers to environment.
6. All the historical facts were _____ by the years.
7. In the result nuclear reaction atoms can be _____ into protons, electrons and neutrons.

Ex. 3. Listen what a chemist and pharmacologist talk about a chemical process. Listen once more and complete the notes

True False 1.Specialists have finished to carry out a new form of aspirin.

True False 2. One of them offers another dosage form.

True False 3. A suppository form is better than a pill.

True False 4. Maria says that they are working on a powder form.

True False 5. Both of them decide to call another pharmacologist to get his advice.

Ex. 4. Fill the gaps with the words in the table. There are more words than you need.

solid	elements	liquid	bond	materials
gas	atom	form	process	compound

For example, two _____: hydrogen and oxygen. Hydrogen has the atomic number _____and oxygen _____. Two molecules of hydrogen and one of oxygen = one _____. Water can change its _____ but is still H_2O. Some chemical processes appear complicated as they have different _____Bonding in different quantities.

Ex. 5. Where can you work and what can you do with the degree in Chemistry and Pharmaceutical Chemistry?

Vocabulary
cure, monitor, waste, produce, oil refining, meet the standard, carry out, replace, go on, looking for, to take out, major concern, to reduce, impact

You study Chemistry at University and probably have decided where you want to continue working. What career opportunities are available? There are two main areas where your knowledge of chemistry will be called upon: medicine and industry.

A lot of chemists work in medicine. The fact is that our hospitals and doctors couldn't work without chemists' support. Chemists carry out the research and develop new medicines, especially more work must be done on antibiotics. Bacteria develop resistance to the drugs and chemists constantly have to test how well these medicines work at new antibiotics to replace the old ones. Besides, there are many diseases which have no cure nowadays and chemists with biologists and doctors are looking for new methods of treatments for AIDS, HIV and cancer.

Chemists have career opportunities within hospitals too. They work in laboratories analyzing samples from patients, conducting blood, urine tests and others. Also, they measure how patients respond to treatment. One of the developing area is testing and recording of DNA samples.

Many of them are in different branches of industry, for example, in food industry creating chemicals to improve the quality of food we eat or the way how to keep it longer and fresh. Some of them deal with control of quality, testing the food to make

sure that it meet the standards. Especially they pay much attention to the imported products.

Russia is a country of oil, gas and other natural resources, you know. So, many chemists are employed in oil refining industry. Oil pass through a chemical process which turns it into many different products. From oil, we can make not only petrol, but also plastics, synthetic fibres, paint and gases for fuel. It is very good, but there are a lot of questions about wastes around this industry. Because of this, there is a special group of chemists who control the waste products of refining process. Chemists are working to filter harmful waste, preventing it from going into the atmosphere, water and soil.

Career opportunities for chemists also exist in education and law. If you have a degree of Chemistry, you can work as a teacher of chemistry at secondary school, college or University. Some chemists are prepared by Law Universities further to work at police. It is very important to do accurate biochemical tests in order to define for example, if you are guilty or not, who is a killer or a thief. They are very important helpers for policemen in uncovering of crimes.

Ex. 6. Answer the questions.

1. How do the chemists help to cure diseases?
2. Why do the doctors need chemists?
3. Why is there always more work to be done on antibiotics?
4. What is the major concern in the oil industry today?
5. How are chemists working to control food products?

Ex. 7. Match these words and phrases

cure	extract
monitor	to be of the right level
waste	to continue
produce	to seek
oil refining	to treat
meet the standard	to observe
carry out	to work out
replace	to be harmful
go on	to minimize
looking for	purpose
to take out	to substitute
major concern	withdrawal
to reduce	to make
impact	to run down

Ex. 8. Write a short essay with the title: " What does Chemistry mean for me?"

Use a plan:

1.Introduction. You can use these words : To begin with, fantastic, wonder, research, to seek and find something new…

- ✓ What do I like Chemistry for?

- ✓ What are the chemists interested in?
- ✓ What area of chemistry do I want to work?

2. May be these words will help you: matter, how it is made, transform into…
   - ✓ Chemistry studies…
   - ✓ What happens when matter changes…
3. Highlights
   - ✓ Transformation – how new chemicals occur
   - ✓ Atomic structure – how materials are made and how they are different from each other
   - ✓ Elements of matter – what they are and what their properties, classification of Mendeleev
   - ✓ Developing new products, designing and organizing chemical processes in industry
   - ✓ Monitoring and improving production

Ex. 9. Discuss these questions with your partners.

- Main branches of modern chemistry
- Recent inventions in the field of chemistry
- Are you sure that you would like to work as a chemist (pharmacist)?
- Could you say that Chemistry (Pharmacy) is one of the best available jobs for you? Give all the pros.

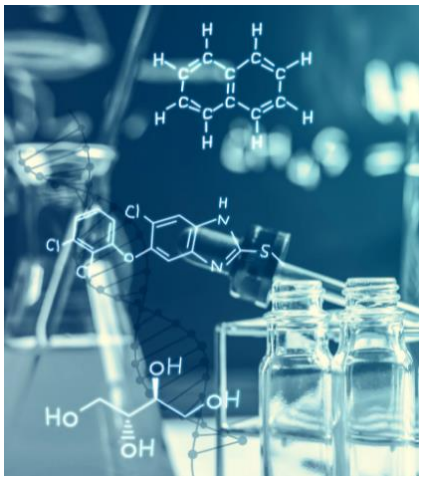
Ex. 10. What verb to use "to make" or "to do"? The meaning of both is «делать». Is there any difference?

1. to (make / do) a suggestion
2. to (make / do) the dishes
3. to (make / do) sports
4. to (make / do) mistakes
5. to (make / do) new friends
6. to (make / do) a cup of tea
7. to (make / do) homework
8. to (make / do) a telephone call
9. to (make / do) your bed
10. to (make / do) shopping

Ex. 11. Read and translate the text. Underline the new words and guess their meaning. If you can't do it, consult your dictionary.

Pharmaceutical and other branches of chemistry.

Pharmaceutical chemistry is the study of drugs, and it involves drug development. This includes drug discovery, delivery, absorption, metabolism, and other processes. There are elements of biomedical analysis, pharmacology, pharmacokinetics, and pharmacodynamics.



Pharmaceutical chemistry involves cures and remedies for disease, analytical techniques, pharmacology, metabolism, quality assurance, and drug chemistry. Pharmaceutical chemists take part in preclinical and clinical investigations. Pharmaceutical chemistry leads to careers in drug development, biotechnology, pharmaceutical companies, research facilities, and more.

Studying pharmaceutical chemistry allows students **to contribute** to life-saving remedies, **enhance** the speed of delivery of new medications, and help others. Pharmaceutical chemistry also includes other branches of study such as **pharmacokinetics, pharmacodynamics,** and drug metabolism. These are important for learning the effects that drugs have on the body. The pharmaceutical chemistry is more involved in research aspects than the customer service and patient care responsibilities of a traditional pharmacist.

Traditionally, pharmaceutical scientists and Pharmaceutical chemists usually work in lab environments of Pharmaceutical industry where they discover, develop, test, **make samplings** and control the quality of new drug therapies that can save lives and improve quality of life. It is important that the product is suitable for **intended use** and for sale.

Besides, documentation is important and necessary at every step of the processes. If a new product does not **meet required specifications**, then the product is considered **contaminated**. Documentation enables **traceability**, but also allows a complete product **recall from** the market, if necessary. Control and **validation** are necessary to be sure that the manufacturing and testing equipment is functional. All operational methods and procedures must also be inspected for accuracy. Most companies do it **voluntarily** through internal audit procedures. All the processes work altogether and they are inseparable. For example, laboratory and manufacturing processes cannot be **regarded** separately. A **holistic approach** looks at all these environments to make sure that the entire process meets high industry standards. Standard operating procedures (SOPs) are written and used by companies to make it easier to follow GxP. These are a set of written instructions to maintain production and results. They are also a basis of every **good quality assurance** and quality control system.

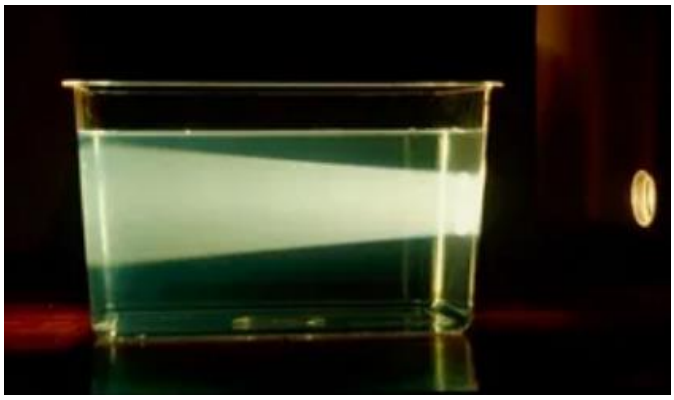
Chemists in the laboratory must be worn protective clothing: eye bath, gas mask, hairnet, laboratory coat, latex gloves, overshoes, safety glasses, bins for toxic substances. Career ways include working in research facilities as large as the Russian Academy of Sciences, Institutes of Health, at pharmaceutical or biotechnology companies, in universities, or for agencies such as Medico-Biological Agency or Russian Agency for Health and Consumer Rights (“Rospotrebnadzor”).

You can get the basic knowledge on pharmaceutical chemistry in universities at chemistry department or in Medical Universities at Pharmaceutical faculties, but you can move up to the next level in your career only after graduating Pharmaceutical Chemistry and Pharmacognosy **residency** training during 2 years with instruction from top professors and interactive discussion.

This degree prepares students for a career in pharmaceutical innovation and drug discovery, or pharmaceutical regulation. Course topics include synthetic medicinal chemistry; drug biotransformation and molecular mechanisms of toxicity; natural medicine products, GDP and GMP systems in pharmaceutical industry, modern approaches of analysis and other aspects. Two years later pharmaceutical residents get a graduate certificate in pharmaceutical chemistry.

Analytical chemistry is a branch of chemistry. It is the study of the chemical components of natural and artificial materials. It tries to analyze chemicals in things. A simple example is how much active substance in one tablet. There are several methods, like **chromatography** and mass **spectrometry** to do this. **Flame tests** can be used for a basic analysis.

Qualitative analysis finds what chemical species are in the sample. **Quantitative analysis** finds out how much of a substance there are in a sample. Substances in a sample are often separated from each other using chromatography before the analysis. This is because a sample can contain many different substances.



Physical and Colloidal Chemistry

Colloids are larger than most inorganic molecules and remain **suspended** indefinitely. They are large molecules, such as proteins, or groups of molecules. They have many properties, depending on their large specific surface. Colloid formation can be classified in two systems, namely **reversible and irreversible**. In an irreversible system, the products are so **stable** or removed so well that the original **reactants** cannot be reproduced. A reversible system is one in which the products can be made to react to reproduce the original reactants.

The word "Colloid" was derived from the Greek, "kolla" for **glue**, as some of the original organic colloidal solutions were glues. This term was first **coined** in 1862 **to distinguish** colloids from crystalloids such as sugar and salt.

Colloids have been studied by scientists since the early 1800's. The early part of the 20th century saw a number of major developments in both chemistry and physics, some of which had direct influences on the study of colloids. A number of methods for studying colloidal particles were developed, including diffusion, electrophoresis and **scattering** of visible light and X-rays. Due to colloidal particles being so small, their individual motion changes continually as a result of random **collision** with the molecules of the dispersion medium. This random, zig-zagging movement is called Brownian motion after the man who discovered it. This motion helps keep the particles in suspension. In the early 19th century, Michael Faraday showed that when you pass a strong beam of light through a colloidal solution, it is scattered. This method to study colloids was further developed by John Tyndall and became known as the "Tyndall effect".

There are two main ways of forming a colloid; **reduction** of larger particles to colloidal size or condensation of smaller particles, e.g. molecules, into colloidal particles. This latter generally makes use of chemical reactions such as **hydrolysis or displacement**. Laboratory and industrial methods make use of several techniques.

A method of forming an **aerosol** is to tear away a liquid spray with a gas jet. The process can be helped by separating the liquid into droplets with electrostatic **repulsions**, done by applying a **charge** to the liquid.

Emulsions are usually prepared by **vigorously** shaking the two constituents together, often with the addition of an emulsifying agent, e.g. a **surfactant** such as soap, in order to stabilize the product formed.

Semi-solid colloids, known as gels, may be formed from the cooling of **lyophilic sols** that contain large **linear** molecules and have a much greater viscosity than the solvent.

Colloids are often **purified** by dialysis, a very slow process, where the aim is to remove a large part of any ionic material that may have accompanied their formation. A membrane is selected that will not allow colloid particles through but will let the solvent and ions **permeate** through. The method relies on diffusion, **osmosis** and ultrafiltration.

Colloidal particles are generally **aggregates** of numerous atoms or molecules. They pass through most filter papers, but can be detected by light-scattering, **sedimentation** and osmosis. A characteristic of colloids is absorption, as the finely divided colloidal particles have a large exposed surface area. The chemical and physical properties of inorganic colloids can be changed dramatically when their size is reduced to a number of nanometers.

Thixotropy is a property exhibited by certain gels. This is where a gel appears solid and maintains its own shape until it is subjected to some force or disturbance, such as shaking. It then tends to act as a sol, flowing freely. This behavior is reversible, and the sol will return to a gel if left undisturbed. Examples of thixotropic gels include certain paints, printing inks and clays.

The particles of a colloid selectively absorb ions and **acquire** an electric charge. The existence of an electric charge on the surfaces of the colloidal particles is a source of kinetic stability for colloids. All of the particles of a given colloid are **repelled** by one another as they all take on the same charge. The movement of colloidal particles through a fluid under the influence of an electric field is known as electrophoresis.

Examples of colloids.

These are just a few of the many examples of colloids, both man-made and natural ones.

Aerosols: Man-made: Aerosol sprays, insecticide spray, smog. Natural: Fog, clouds.

Solid aerosol: Natural: Smoke, dust.

Foam: Man-made: Shaving lather, whipped cream.

Emulsions: Man-made: Mayonnaise, cosmetic lotion, lubricants. Natural: Milk.

Sols: Man-made: Paint, ink, detergents, rubber (a latex -also occur naturally).

Solid foams: Man-made: Marshmallow, styrofoam, insulation, cushioning.

Gels: Man-made: Butter, jelly.

Solid sols: Man-made: Certain alloys. Natural: Pearl, opal.

Biological macromolecules and cells may be considered to be biocolloids and many foods are also colloidal in nature.

Ex. 12. Answer the questions to the text.

1. What does the colloidal chemistry study?
2. What did types of dispersion systems classify?
3. Give examples of man-made colloids.
4. Give examples of natural colloids.
5. Describe the process of dialysis.
6. What are the ways of a colloid forming?
7. What does Pharmaceutical Chemistry deal with?
8. What does Qualitative analysis find?
9. What analysis finds out how much of a substance are there in a sample?
10. Can you give the definition of "hydrolysis"?

Vocabulary

Absorption is a phenomenon that occurs when matter crosses from one phase to another passing through the border surface and in the other phase more or less monotonously distributes itself in a concentration higher than the one within the first phase

Adsorbent is a substance on the surface of which a substance is adsorbed.

Aerosols are colloidal dispersions of liquid or solid particles in a gas, as in a mist or smoke. The commonly used aerosol sprays contain an inert propellant liquefied under pressure. The pressure of the gas causes the mixture to be released as a fine spray (aerosol) or foam (aerogel) when a valve is opened.

Binary solution is a mixture of two liquids that are completely miscible one with another.

Calibration is a process in which the operation of the mass spectrometer in a specified manner is adjusted and certified to produce the accurate and known ion masses in the spectrum of a standard compound.

Colloid mills are machines used to grind aggregates into very fine particles or to apply very high shearing within a fluid to produce colloid suspensions or emulsions in which the particle sizes are less than 1 micrometer. One type of colloid mill is called a disc mill, in which a mixture of a solid and liquid (or two liquids) is passed between two discs a small distance apart, which rotate very rapidly relative to each other.

Colloid silver is a bright blue-green powder which dissolved in water gives colloid solution of red colour.

Colloidal particles may be gaseous, liquid, or solid, and occur in various types of suspensions.

Colloids are systems in which there are two or more phases, with one (the dispersed phase) distributed in the other (the continuous phase). Moreover, at least one of the phases has small dimensions, in the range between 1nm and 1μm (10-9m-10-6m). Dimension, rather than the nature of the material, is characteristic. In this size range, the surface area of the particle is large with respect to its volume so that unusual phenomena occur, e.g., the particles do not settle out of the suspension by gravity and are small enough to pass through filter membranes.

Colorimeter is an instrument used to measure the strength of colorification in a solution.

Condensation, in colloid systems, is a process where smaller particle join in one colloid size particle. Spectroscopy is a study of the interaction of matter and elect romagnetic radiation, usually as a function of the radiation wavelength.

Dialysis a very slow process, where the aim is to remove a large part of any ionic material that may have accompanied their formation.

Diffusion is the spontaneous mixing of one substance with another when in contact or separated by a permeable membrane. Diffusion is a result of the random motions of their component atoms, molecules, ions, or other particles. Diffusion occurs most readily in gases, less so in liquids, and least in solids.

Emulsions are colloidal systems in which the dispersed and continuous phases are both liquids.

Filtration is a procedure in which liquids are separated from the precipitate by passing a suspension through the filter. The precipitate remains on the filter and through it the filtrate passes. Gaseous heterogeneous mixtures can also be filtrated.

Flotation is a procedure in which hydrophobic solid substances are separated from hydrophilic one using bubbles of air. If air is blow through a suspension, in which substances promoting easier creation of foam are added, bubbles of air are created which stick to the hydrophobic matter and carry it out to the surface.

Foams are dispersions of gases in liquids or solids.

Gel are colloids in which both dispersed and continuous phases have a three-dimensional network throughout the material.

Nonpolar solvent is a liquid with nonpolar molecules. It dissolves covalent compounds, non water solvent.

Osmotic pressure is the excess pressure necessary to maintain osmotic equilibrium between a solution and a pure solvent separated by a membrane permeable only to the solvent.

Ostwald's viscometer is a simple appliance used for determining relative viscosity.

Saturated solution is a solution that holds the maximum possible amount of dissolved material. When saturated, the rate of dissolving solid and that of recrystallization solid are the same, and a condition of equilibrium is reached.

Sols-dispersions of small solid particles in a liquid

Spectrophotometry is a determination of the concentration of a material in a sample by measurement of the amount of light the sample absorbs.

Thermostat is a device which controls the heating or cooling of a substance, by turning the machinery on or off, in order to maintain a constant temperature.

Tyndall's effect occurs when light disperses on colloid particles. This phenomenon can be seen when a ray of light enters in dark room through a small hole. In the beam some dust particles of colloid dimensions can be seen sparkling.

Viscosity (η) (coefficient of viscosity)is the resistance a liquid exhibits to flow.

Unit 4. Biology. Botany. Ecology and Pharmacognosy

Key words: anther, bile, bladder, branch, bud, bulb, buoyant, chemical reactions, chloroplast, corm, cytoplasm, disperse, epicarp, glycogen, grafting, hardwood, intestine, leaves, mesocarp, mitochondria, nucleus, nuclei (pl.f.), organelles, pollen grains, pollinate, pollination, rigid, runner, scatter, softwood, starch, stem, stomach, vacuole, vocal cords, waterlogged

Ex. 1. Before You have already studied some aspects of Biology.Test yourself if you know about these things

1. What does a plant cell consist of?
2. What does an animal cell consist of?
3. What is the difference between their structure ?
4. What are the ways of reproduction of plants?
5. What parts of a plant can you name?
6. Name parts of a leaf, could you?
7. Try to describe the process of photosynthesis.
8. What is the reason and the consequences of acid rains?
9. How the excessive amount of ozone can damage “mouse and man”?
10. What is a role of plants’ roots?

Ex. 2. Read the text and sort the information into the table.

Plant cells and animal cells share a number of characteristics. Both plant and animal cells usually have a nucleus. Both types of cell also have cytoplasm where the chemical reactions occur. They also both have the cell powerhouses, the mitochondria. Plant cells have a rigid cell wall which means that there is little variation in the shape of plant cells. Animal cells have no cell wall and so there is more variety in cell shape according to function. While plant cells have chloroplasts animal cells do not. A characteristic of plant cells is the large central vacuole and plant cells may also have other small vacuoles. Animal cells have small vacuoles or none at all. Food stored in plant cells is stored as starch whereas in animal cells it is stored as glycogen.

There are different kinds of cells in the body: epithelial cells, nerve cells, white and red blood cells, muscle cells.

What is the cells function? Cells cause the body to move by contracting, they have the job of carrying messages around the body, perform a protective function, kill bacteria and viruses, transport oxygen around the body and help to remove waste such as carbon dioxide.

Plant cells contain…	Animal cells contain…	Plant and animal cells contain…
1. 2.	1. 2.	1. nucleus 2.

Ex. 3. Put the phrases in the correct order to make sentences. Translate them into Russian.

1. building blocks Cells of a living organisms. are there

2. multicellular organisms while only one cell, Unicellular organisms of many cells. Consist of are made up

3. are embedded. the jelly like material The cytoplasm is the cell in which the organelles inside

4. controls The nucleus of a cell. of a cell all the functions

5. are the site of respiration where energy Mitochondria from food. In a cell, is released

6. Plant cells a cell wall and chloroplasts. animal cells have a large central vacuole, differ from in that most

Ex. 4. Match the beginnings and endings of the sentences

1. The organ inside the skull in vertebrates that controls all activities including physical and nervous activity and intelligence is 2. The heart in humans and most other animals is 3. The kidney is 4. The organ in the throat that contains the vocal cords which produce sounds is 5. The oesophagus is a 6. The tube at the back of the throat that goes from the larynx to the bronchi where air travels down into the lungs is 7. The organ in the body that changes toxins such as alcohol into less harmful substances, and produce bile, urea, and cholesterol is 8. The duodenum is 9. The small intestine is 10. The small tube attached to the lower end of the small intestine in humans and some other mammals is 11. The bladder is	a) tube that carries food from the mouth to the stomach. b) called the brain c) called the trachea. d) known as appendix. e) known as a liver. f) double bean-shaped organ which clean the blood by removing waste products such as urea and also control the level of water and salts that the blood contains. g) the first section of the small intestine, just after the stomach. h) the larynx. i) the organ that pumps blood around the body. j) The part inside a body like a bag where urine collects before being passed out of the body. k) The tube in the body that food goes into after it has passed through the stomach

Ex. 5. Study the methods of plants reproduction.

It is known that there are two methods of plants reproduction: natural and artificial. Natural ways are by insects, wind, water, birds and animals. For example, coconuts are the best known seeds that are dispersed by water. The have a buoyant husk which is the mesocarp of the fruit. As the fruit dries in self-dispersed plants, tension builds up in parts of the seed coat until it splits. Seeds with a buoyant husk can float long distances by sea before they are washed up onto the shore. Self-dispersing fruit split with a sudden explosion which scatters the seeds quite widely. The waterproof epicarp of coconuts, the skin of the fruit, prevents them from becoming waterlogged during their journey. Natural reproduction occur not only with the help of seeds but also roots, leaves, stem, buds, bulbs, runners, corms etc.

One of the most important methods is pollination. Pollination is performed by wind or insects. Insects prefer large, bright flowers with small amount of pollen and sticky surface, which have sweet and strong scent. The brightest example of this type of flowers is a flower of mango. The flower is very beautiful, but the smell is awful like a smell of rotten meat. A lot of bees you can see around aconite, apple-trees, cherry-trees, snow-ball tree and hawthorn.

Artificial methods of vegetative reproduction of plants are performed by a man, particularly farmers and gardeners in order to improve the quality and increase the volumes of harvests.

Ex. 6. Fill the gaps with the words:

types, roots, technique, soil, plants, hormones, cuttings, potato

1. Softwood plants such as sweet_____, cactus and Joseph's coat can also be grown from cuttings.
2. Farmers and gardeners often use different_____ of artificial asexual reproductive techniques to increase the plants that they grow.
3. They choose high-quality_____ that grow well and reproduce them asexually so that they have more high-quality plants.
4. Some of these techniques are _____ budding and grafting.
5. Taking cuttings is a very simple_____ commonly used with hardwood plants such as sugar cane, cassava and hibiscus.
6. It involves cutting a leafy branch or stem through at an angle and placing it in_____ which contains lots of air.
7. The branch must be watered daily until_____ develop at the cut end of the stem.
8. Some people use plant_____ to encourage root growth.

Ex. 7. Complete the sentences with one of the words in brackets

1. Seeds are dispersed by different (times/places/methods), depending on the adaptations of the fruit.
2. The importance of fruit is in the (collection/ dispersal/falling) of seeds.
3. If seeds (hang/fly/drop) beside the parent plant and germinate there, they will be competing with the parent for water, light and nutrients.

4. However, if they are carried some distance, there is a better chance of getting the (conditions/partitions/fractions) they need for germination and good growth.
5. This is often with the assistance of (superior/internal/external) agents, such as animals, water and wind.

Ex. 8. Define the method of pollination, if it is wind pollination or insect pollination.

… have feathery stigmas to catch airborne pollen grains.
… are generally directed upwards.
… hang down.
…produce a large amount of pollen.
…have large, brightly coloured petals.
…are odourless and produce no nectar.
… have relatively large pollen grains with a rough or sticky surface.
… have small, light and smooth pollen grains.
… produce a relatively small amount of pollen.
… have rigid and smooth stigmas, which are sticky at the tip.
…have stigmas anthers which hang outside the flower for easy shaking in the wind.
… have stigmas and anthers which are usually inside or partly enclosed in the flower.
…have sweat scented flowers which usually produce nectar.
… are usually small with small petals that are not very conspicuous.

Complete the table.

Characteristics	**Insect-pollinated flowers**	**Wind-pollinated flowers**
Petals		
Nectar production		
Direction of flowers		
Location of stigmas and anthers		
Stigmas		
Amount of pollen		
Pollen grains		

Grammar

Modals

Мы используем модальные глаголы и выражения с модальными глаголами для того, чтобы выразить:

✓ долженствование и необходимость:

We have to leave for laboratory a bit earlier to start our research on time.

✓ разрешение или запрещение:

We mustn’t disturb the laboratory animals at night.

✓ ненадобность, нет необходимости в чем-либо:

You needn’t worry, the doctor and pharmacist will explain everything.

✓ способность что-либо делать:

Two or three years later we will be able to prepare medicines by ourselves.

✓ возможность, вероятность:

I could call them and explain what to do, the students couldn't manage over with this problem without me.

✓ догадку или предположение:

These young men are speaking Spanish, they might be from Spain or Mexico.

✓ прогноз, предвидение, предсказание:

It's too late, she won't come.

Non-achievers may pass their exam in chemistry if they try hard.

What is the difference between ***didn't need to*** and ***needn't***

Мы используем выражение ***didn't need to*** + инфинитив, чтобы сказать, что кто-то что-то не сделал (в прошедшем времени) т.к. это было не нужно. Например, She ***didn't need to go*** to the University to pass the exam because she had passed it beforehand.

Выражение needn't + Perfect Infinitive используется тогда, когда мы говорим, что кто-то уже сделал что-то, но в этом не было необходимости.

Например, I needn't have bought any ointment more, there was plenty of it.

Ex. 9. Complete the sentences with the words below.

pneumonia	tuberculosis	psoriasis	angina	mumps	stroke	covid-19

Helen has a high temperature, she feels a pain in her right lung and finds it difficult to breath out. She could have _____ or_____ .

1. For six months Nick was living among African wild tribes and now has got a subfebrile temperature and severe cough with mucous and blood. He could be suffering from_____ .
2. My friend has got some rosy spots on the heads skin, they are itching and exfoliating. He might have _____ .
3. If her blood pressure remains high, she may have_____ .
4. If you are experiencing pain at rest as well as on exertion, you may develop _____ .
5. A child who has enlarged parotid glands and is experiencing difficulty opening the mouth might have caught _____ .

Ex. 10. Complete the sentences with the modals, they are more than you need.

didn't need	don't need	may
could have	have to	must

1. When I saw him, I thought he _____fallen into the pond. His clothes were wet.
2. I _____ to switch off the computer, it turned off itself.
3. You_____ to show your passport to get in. You are in the list of guests.
4. _____ I use your computer to look in my e-mail. My own is wrong. I'm waiting a very important letter.
5. I_____ remember to call my tutor.

Ex. 11. Translate the sentences into English

1. Вам не стоит беспокоиться. Лаборанты подготовят все необходимое для эксперимента.
2. Нет необходимости идти на лекцию в Университет. Занятие может проводиться в ZOOM.
3. Как ты думаешь? Кто эти люди, врачи или провизоры? Должно быть провизоры. Один из них читает Фармакопею.
4. Нам необходимо покинуть помещение. Возможно, сработала пожарная сигнализация.

Unit 5. Health and Ecology

Key words: acid rain, airtight, bleach, carbon monoxide, caustic, chlorine, contaminate, corrosive substance, exhaust, explosive, fuel, gasoline, hazard, hazardous, irritant, pesticide, prevent

Ex. 1. Read the text "What on Earth can we do to save the planet".

With scientists and environmental groups wondering the right subjects, or teaching out loud whether the human race will survive to the end of the century, it is a good moment for people in education to consider whether they are teaching them right.

After all, the people about to pass through universities are those who will decide whether Homo sapiens makes it beyond 2100. If the next generation of students do not get the message concerning the way our planet is heading, and act on the information, the future does indeed look bleak.

Nearly every institution now has courses that mention the world in its title. And even the best courses do not take in the single big question – will the world as we are shaping it survive?

The biosphere is the region of the Earth's crust and atmosphere where life exists. It includes our physical environment and a biological community of interacting organisms. We are among these organisms that cannot survive without the environment. We speak much about it but aren't doing much.

There are many examples of our destruction of the planet. Thousands of lakes are already lifeless and we continue putting toxic substances into the atmosphere. These pollutants (acidic particles and solutes) end up on the land and in the water and become part of our daily diet. Every year we lose about 7 million hectares of fertile land. We are also destroying millions of hectares of forests that produce the oxygen we breathe. Our cities consume and contaminate the natural environment- they are like enormous parasites that need to eat everything around them to survive. We produce rubbish, consume rubbish and are surrounded by rubbish. We don't know what to do with it: we bury it, throw in the seas, and we even send it outer space!

The scientists have given their starkest warning yet that a failure to cut greenhouse gas emissions will bring devastating climate change within a few decades. As droughts affect more areas for more prolonged periods, it is estimated that global food production will fall by 10%. The fact is? We are experiencing more powerful hurricanes, which results in both human tragedy and costly damage to infrastructure.

The latest report from the Intergovernmental Panel on Climate Change (IPCC) concludes that average temperatures could increase by as much as 6.4º C by the end of the century if emissions continue to rise at the present rate. The forecast is still higher than previous estimates because scientists have discovered that the Earth is less able to absorb carbon dioxide than previously believed.

What would a 4º C increase in temperature mean? According to the IPCC, it would wipe out hundreds of species, bring extreme food and water shortage in vulnerable countries and hundreds of millions of people would be displaced as a result of catastrophic flooding.

Climatologists explained that the report paints a gloomier picture than previous ones because scientists have discovered "feedbacks" in the global carbon cycle that seem to be adding to the amount of carbon dioxide in the atmosphere and producing a cumulative effect. But we must say that such outcome is not inevitable. If there were a significant switch to clean and resource – efficient technologies, we could cut expected temperature rises by half. Scientists stress that what is needed is international political commitment to take action- something which has been absent so far.

Ex. 2. Discuss these questions.

1. Would you say this article is mainly reporting fact, opinion or a mixture of both?
2. What specialists, apart from the journalist, are represented?
3. What do they add to the basic statement that global warming exist?
4. What area of the world do you live in?
5. Do you think climate affects people's personalities or mood?
6. What would be your idea of a perfect weather climate?
7. Have you ever experienced conditions similar to the ones in the photos?

Ex. 3. Match a word from the list (a-i) with a word which collocates (1-9).

Here are some phrases related to the weather and climate.

a.	torrential	1.	defences
b.	high	2.	freezing
c.	ice	3.	forecast
d.	sea	4.	cap
e.	below	5.	rain
f.	long-range	6.	tide
g.	ozone	7.	wave
h.	heat	8.	footprint
i.	carbon	9.	layer

Ex. 4. Complete this blog with some of the collocations from ex.3

It may be the start of spring here, but no one seems to have told the weather! We've just had a severe storm which even ripped roofs from the houses. What's more, there has been 1. Which has caused flood alerts to be issued for some areas. This makes you really believe what they say about the 2. Melting – floods seem to have been in the news a lot more over the last year or so. Costal areas have been prone to flooding too – this spring, 3 have been at record levels in the Severn estuary. This means 4 have been breached and waves have rolled into some village centres. As if all this wasn't enough, night temperatures have been 5 all week, leaving gardeners stuck as to what they should do with their spring plants.

Ex. 5. Put the sentences, which contain phrases for drawing conclusions, in order.

a) conclusion / the / temperature/ over / the / couple / In / we / world's / has / risen / last / of / can / say / decades / that / significantly /.
b) whole / weather / experiencing / the / may / are / extreme / conditions / On / be / we / more / it / said / that /.
c) scientists / following / with / interest / increased / are / Therefore, / concluded / it / that / all / changes / climate / be / can /.
d) Reduce / the / threat / Given / that / unless / emissions / is / this / be / countries / under / climate / carbon / may / deduced / it /.

Ex. 6. Fill in the gaps in the sentences with these words:

air pollutants	carbon monoxide	fire	fuel	foam	hazard	injures	precautions

1._____ should be taken to avoid accidents.
2.Heat, _____ and oxygen are the conditions required for fire.
3. A _____ is extinguished if any one of these conditions is removed.
4. Water, carbon dioxide, dry chemical powder and_____ are used in different kinds of fire extinguisher.
5. _____ is poisonous because it bonds with haemoglobin and prevents it from carrying oxygen to the cells.
6._____ have adverse effects on the environment and health of individuals.
7.Safety symbols are universal and colour-coded to indicate danger (red),_____(yellow), no risk (green) and mandatory (blue).
8. First aid can be used for minor___ but medical help should be sought for more major ones.

Ex. 7. Match the beginnings and endings of the sentences.

Beginnings	Endings
1. Microorganisms, such as bacteria and fungi,	a. act as host to human parasites.
2. The growth and development of microorganisms	b. be hazardous to the environment and to the health of humans and other useful organisms.
3. Food preservation methods	c. are effected by temperature, moisture, oxygen and acidity.
4. Parasites are microorganisms that	d. biodegradable (decays) or non biodegradable (does not decay).
5. Pests may	e. by making antibodies.
6. Pesticides are chemicals that	f. cause decay.
7. Herbicides kill plant pests (weeds) while	g. feed on living material.
8. The use of pesticides can	h. include reuse, recycling and converting to energy (e.g. biogas).
9. Biological pest control involves	i. include salting, heating, refrigeration, drying, pickling and adding of sugar.
10. The improper disposal of waste	j. insecticides kill insects
11. Refuse can be classified as	k. introducing the natural predator or parasite of the pest.
12. Alternative methods of waste disposal	l. kill pests.
13. Your immune system protects you from infection	m. will result in many health problems and the spread of diseases.

Ex. 8. Read the text and fill the gaps with these words

antibodies | chickenpox | immunity | lymphocytes | infection | microorganism | vaccination | vaccine

We can trick the body into responding to an [1] without actually becoming ill. Do you remember going to the doctor to get [2] against [3], hepatitis B and measles when you were younger? Vaccines are " pretend" infections. The vaccine is either made from a very small amount of the dead [4] or the toxins that it makes. When you receive the vaccine the white blood cells [5] identify them and begin to make antibodies against the infection, but because the microorganism is dead (or not even there), you do not get ill. Just as with natural [6], these antibodies stay in the bloodstream for a very long time. So when you come into contact with the live microorganism, [7] are produced rapidly and you will not become ill. This is known as artificial immunity. Many infections can now be avoided by being given the [8] for them before we come into contact with the live versions.

Ex. 9. Complete the text by filling in the missing information. The first and the last letters are given to help you.

Acquired Immune Deficiency Syndrome (AIDS)

Acquired Immune Deficiency Syndrome (AIDS) is the worst sexually t_ _ _ _ _ _ _ _ _ d disease. It is caused by the Human Immunodeficiency v_ _ _s (HIV) which attacks the immune system. The i_ _ _ _e system usually plays an important part in fighting off infections.

HIV is transmitted through contact with the i_ _ _ _ _ _d person's body fluids, such as semen, blood and vaginal secretions. HIV is not only transmitted by sexual intercourse, but also in infected blood t_ _ _ _ _ _ _ _ _ _s, from an infected expectant mother to her unborn child, or between drug addicts sharing an infected needle. HIV reduces the protective function of the immune system by destroying the cells that produce a_ _ _ _ _ _ _ _s to fight against viruses and bacteria that enter the body.

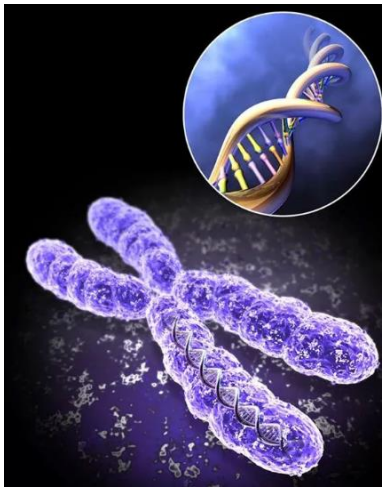
When the immune system breaks down, the person will then suffer many infections and diseases. These are called o_ _ _ _ _ _ _ _ _ _ _ _c infections because they take advantage of the body's weakened defences. This is what we call Acquired Immune D_ _ _ _ _ _ _ _ y Syndrome (AIDS). A person can be infected with HIV for up to 10 years before showing any signs of AIDS. The person usually dies from one of these opportunistic infections, not from the HIV virus itself. To date there is no cure for HIV/AIDS. However, patients are usually treated for the various opportunistic infections.

The drug AZT (azidothymidine) can cause the HIV virus to take much longer to develop into AIDS, and so prolong the life of an HIV-infected individual. It is also widely accepted that the use of a latex c_ _ _ _ m while having intercourse will p_ _ _ _ _ t the transfer of the virus from an infected individual to another.

Unit 6. Heredity. Genetics

Key words: *genetics, inheritance, anatomic, functional, body cell, cystic fibrosis, division, recessive, homozygous, meiosis, parent, dominant, heterozygous, mitosis, chromosome, DNA proteins, genes, genome, ethical, cloning, relativity*

Ex. 1. Read the text. What new have you learnt?



Heredity, also called inheritance or biological inheritance, is passing on of traits from parents to their offspring; either through asexual reproduction or sexual reproduction, the offspring cells or organisms acquire the genetic information of their parents.

Genetics is a science of inheritance. It studies the cells and the anatomical and functional characteristics transmitted from parents to children.

A cell is an intelligent organism made from atom. We are made from more than sixty billion cells. There are cells to make bones, muscles, blood and so on. In the nucleus of every cell there are 23 pairs of chromosomes, half of them are from the mother and the other half are from father.

Chromosomes are made from DNA (deoxyribonucleic acid) and protein. Each chromosome contains many genes in its DNA. The DNA carries the instructions to construct a human being.

Each species has its own sets of genes. The different combinations of genes determine the characteristics of each individual. With the exception of identical twins, nobody in the world has the same combination of genes and this is what makes everyone a unique individual. What all humans do have in common is the genome, that is, we all have the same number of chromosomes and the same genetic material. There are no superior or inferior genes.

Genetic manipulation refers to human intervention in the design or function of the cells. Many people oppose it. They argue that the main problem is that man can be both a master and a monster. At an institute of pharmaceutical engineering in Virginia, USA, scientists injected pigs with a human gene that produces a protein called Factor VIII. This protein makes the blood thicker and helps patients with hemophilia. The fourth generation of these pigs will possibly produce enough Factor VIII in their milk to supply the world's demand. On the other hand, through genetic manipulation people could select spermatozoids and decide the sex of their future babies. This alerts the course of nature and for many people it has ethical implications.

Cloning is another important topic. From a few cells scientists can produce cartilage. This will probably soon help who don't have a part of their face, like an ear, after an accident. But in the future we could clone and manipulate people.

Our problem is always the same. People disagree about what is ethical and what is not.

Ex. 2. True, False, No information

True False The scientists can obtain cartilage from a few cells.

True False There are only superior genes.

True False Each Species has got different sets of genes.

True False We need the same set of cells to make bones and muscles.

True False Every nucleus has 23 chromosomes.

True False There are different combinations of genes to have individual characteristics.

True False In the beginning of the new century the UNO restricted the cloning

True False The scientists found the remedy for hemophilia.

Ex. 3. Put the words in the correct order to make sentences

1.During fertilization,/ so a new offspring / the full number of 46 chromosomes like the parents.

2. We all/ chromosomes/ have the same number of / genetic material/ and the same.

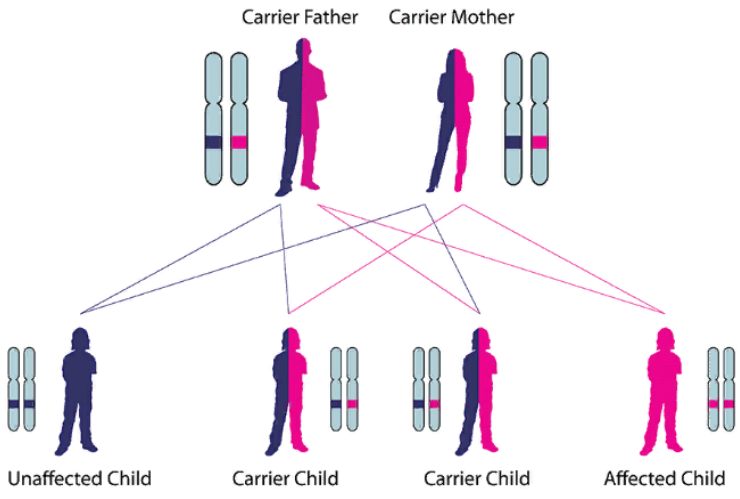
3. is an/ made from/ intelligent/ organism /atom /A cell.

4. made from /more than/ sixty /We are/ billion cells.

5. In the nucleus/ and the other half are from father/of every cell/ of chromosomes,/ half of them are from the mother/ there are 23 pairs

Ex. 4. Read the text about Diseases of genetic and inheritance origin

Some human diseases result from mutations in the genome contained in the DNA. A gene is a discrete linear sequence of molecular units of the DNA. All in all there are 20,000 to 25,000 genes in the human genome. Any alteration of the DNA may result in the defective synthesis and make one or more proteins functioning incorrectly. If altered protein is a key enzyme, the error may be serious or even fatal.



Large mutations, which include alterations to chromosome structure and number, are rare because most cause such large disruption to development that the fetus is usually aborted. However, some alterations are not so immediately lethal, and the fetus can survive but with some disorders. For example, Down syndrome which involves an error in the division of 21-st

chromosome, which changed into trisomy (three copies instead two). So, the total number of chromosomes is 47 instead of 46. One chromosome is extra. Chromosomes determine how a baby develops inside mother's body and how the baby will grow after the birth. The trisomy 21 changes child's body and brain develop. Usually people with Down syndrome have different abilities, but they have common physical features: they are smaller in height, their hands and feet are small, they have a short neck, a flattened face with almond-shaped eyes, a single line on the palm, tiny white spots on the iris of the eye, poor muscle tone, a tongue which sticks out of the mouth. Besides visual distinctive features the people with Down syndrome might be deaf, have ear infections, eye diseases, heart defects and obstructive sleep apnea. Of course, modern medicine can

detect with the help of screening test if there is Down syndrome or not. However, the test cannot stop or predict impact of syndrome on the baby's development.

Down syndrome is a lifelong state. Specialists of Medical service help such children and try to improve their mental and physical abilities, develop speech and other skills which will be necessary for him or her in their future life. Not all of them are disabled, they can be occupied in different spheres of activity.

Ex. 5. Make up 8-10 questions to the text

1. What is …..?

_____

2. How many genes are ….?

_____

3. What result can any alteration…..?

_____

4. ….. trisomy?

_____

5. Do chromosomes …..?

_____

6. Are the people with Down syndrome…..?

_____

7.How many lines …… normal …..?

_____

8. How can doctors ….. Down syndrome?

_____

9. What other disorders….?

_____

10. How long do the people with Down syndrome ….?

_____

Ex. 6. Make up a situation about the difference between genetic and hereditary diseases using the key words and phrases.

Heredity is …

A person is a mix of genes inherited from his or her mother and father. These genes, small parts of chromosomes, to determine , visible characteristics, eye color, skin color, hair color, traits that cannot be seen, for example, certain diseases.

each cell, to contain, two copies of each gene: one, to come from the egg of the mother, and one from the sperm of the father, these two copies, to be a bit different from each other, a child , to have characteristics from the mother, from the father, but , to be never identical to others.

a gene, that, to work, usually can make up, a defect. For example, a gene with a defect, to cause a particular disease, may jump, over generations, of a family, not to cause, a disease. Due to the normal gene, in the pair to work well enough, to hide the defect. On the contrary, if an offspring, to inherit two defective genes, he or she, to develop the disease. It is an explanation why offsprings, might be with the disease, while, their parents do not have.

The bright example of this case is hemophilia. Everybody knows hemophilia to be the disease of males, but carriers are women.

The Causes of Genetic Diseases

Sometimes, genetic disorders can be inherited. So, people are born with them. At first, they may be not noticeable. Sometimes, disorders may be unpredictable, and occur suddenly when certain mutations develop in the process of cell division. They also are genetic disorders, because of changes in the genes.

For example, hemophilia A, approximately occurs 1 in 5,000 males. It is characterized as a disorder of blood clotting. It occurs when the child's father is a hemophilic male and a mother is a carrier of a hemophilic female. The symptoms of hemophilia are bleeding internal and external as well. It is diagnosed with coagulation test. PTT test is the first test to diagnose hemophilia. The treatment is individual, but the most people with hemophilia need regular intravenous recombinant ot plasma concentrate Factor VIII.

The people with hemophilia are exposed to viral infections because of frequent blood transfusions which put them at risk of HIV, hepatitis A,B,C, G. Average lifetime is from 59 to 72.

In other disorders, however, genetic and environmental factors seem to work together to cause changes in otherwise normal genes. For example, some forms of radiation or chemicals can cause cancer, for example.

Another example is when the virus of German measles (rubella) infects a mother and fetus during the pregnancy and alerts normal development of the baby. This case is not genetic. There are many disorders in which there is a familial tendency to develop the disease. Many forms of cancer, high blood pressure, arthritis, obesity seem to have a familial tendency. Although the exact roles of environmental may be present in all these cases, for example, chemicals, physical injuries, radiations.

Ex. 7. Answer these questions. You may work in pairs or small groups.

1. What is the difference between genetic and hereditary diseases?
2. What are the signs and symptoms of the hereditary diseases?
3. What are the distinctive features of genetic diseases?
4. Do you know the people with these diseases?
5. Why is rubella considered to be very dangerous for pregnant women?
6. What does determine the visible characteristics of a baby?
7. Why is a baby ill while his(her) parents are not?
8. What is the cause of hemophilia?
9. Can we delay or stop familial diseases?
10. Could you give some examples and advice to avoid such diseases?

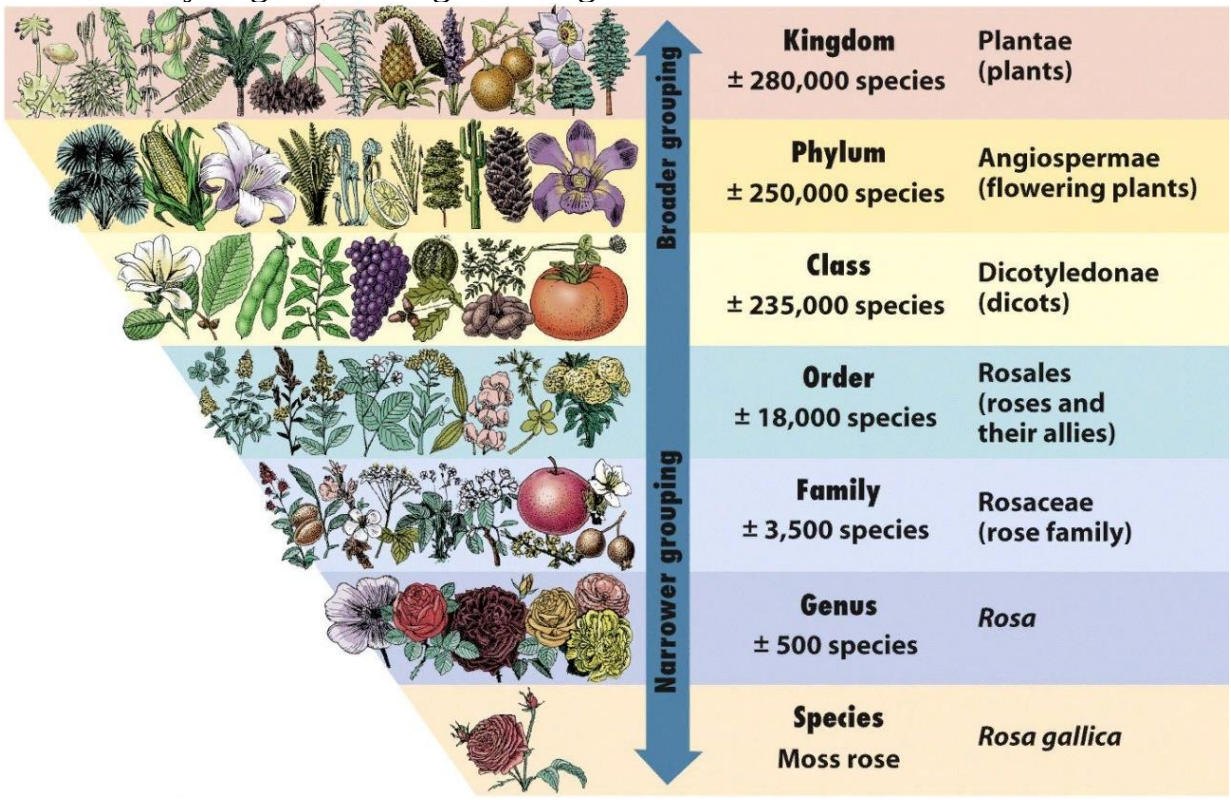
Unit 7. Pharmacognosy. Medicinal plants.

Key words: pharmacopeia, classification, morphology, identification, cultivation, collection, production and utilization of drugs, evaluation, organoleptic, serological, family, tribe, genus, species, layman

Ex. 1. Read the text about pharmacognosy and answer the questions

Pharmacognosy is a science which studies drugs of natural origin, heir physical, chemical, biochemical and biological properties, drug substances of natural origin as well as the search for new drugs from natural sources. Pharmacognosy consists of various aspects: classification, morphology, identification, cultivation, collection, production and utilization of drugs; evaluation of drugs by their physical, chemical and organoleptic properties; biological screening of herbal drugs; extraction, isolation and purification of herbal drugs and modern plant biotechnology.

All the plants possess different characters of morphological, microscopical, chemical, embryological, serological and genetics.



Family: These are plants with many botanical features in common. At this level, the similarity between plants is often easily recognizable by the layman. Modern botanical classification assigns a type plant to each family, which has the particular

characteristics that separate this group of plants from others. The names of the families end in *–aceae.*

Tribe: A further division of plants within a family, based on smaller botanical differences, bin still usually comprising many different plants. The names of the tribes end in *–eae.*

Genus: This is the part of the plant name that is most familiar; the normal name that you give a plant—Papaver (Poppy), Aquilegia (Columbine), and so on. The plants in a genus are often easily recognizable as belonging to the same group.

Species: This is the level that defines an individual plant. Often, the name will describe some aspect of the plant—the colour of the flowers, size or shape of the leaves, or it may be named after the place where it was found. Together, the genus and species name refer to only one plant, and they are used to identify that particular plant.

Answer the questions:

1. What is pharmacognosy and what does it deal with?
2. What is the structure of pharmacognosy?
3. What characters do all plants possess?
4. How to identify the species of the plants?
5. What does the name of the plant describe?
6. What is the name of the method which helps us to define the plant using organs of senses?

Ex. 2. Additional reading:

Poisonous plants

Spread over 1,575,107 square miles and endowed by nature with a wide variety of physical and climatological conditions, India possesses what is perhaps the richest and certainly the most varied flora of all other areas of similar size on globe. India has an area of culturable land of about 450 million acres, excluding a forest area of 83 million acres of which the total gross cropped area sown each year is approximately 285 million acres.

Plants are of great importance to us. India abounds in all kinds of food plants, spices, perfumes, timber, fibres, gums, etc., which have been known all over the world from ancient times. There are about 700 species of food and fodder plants including 260 species of valuable fodder grasses. Nearly 2,000 species of medicinally active plants have been found in India. Many other plants are also present which contain certain constituents which, if introduced in the body in relatively small quantity, act deleteriously and may cause serious impairment of body functions or even death. They primarily injure the basic living principle the protoplasm. These plants are known as poisonous plants. Recent studies have revealed that in India there are about 700 poisonous species belonging to over 90 families of flowering plants. Some of these are Ranunculaceae, Euphorbiaceae, Leguminosae, Solenaceae, Compositae, Apocyanaceae, Asclepiadaceae, Liliaceae, Graminae, Aracae, etc.

Definition of poisonous plants

A poisonous plant is one which, as a whole or a part thereof, under all or certain conditions and in a manner and in amount to be taken or brought into contact with an

organism will exert or cause death either immediately or by reason of cumulative action of the toxic property due to the presence of known or unknown chemical substance in it, and not by mechanical method.

The points which should be borne in mind before terming a plant as poisonous are:

1. The seeds of certain plants like aristida may pierce the skin giving rise to subcutaneous or intramuscular abscesses. These seed have bored into the salivary ducts of the cattle and caused injury. This action is purely mechanical, so it cannot be termed as poisonous plants.

2. All parts of the plant may not be poisonous. Seed of family Rosaceae contain dangerous amount of prussic acid but the outer fleshy portion of the fruit is eaten.

3. Certain plants are poisonous to one species and the same quantity may not affect the other species. Example; Belladonna is poisonous to most species but rodents like rabbit can have it in large quantities.

4. Some plants if eaten affect only a particular organ of the body. It does not cause serious body harm but render the organ unable to carry on their normal functions, e.g. *Senecio* of sunflower family causes hepatic cirrhosis in man and animals and prevent the liver from carrying out its normal functioning.

5. Certain plants loose their toxicity on being dried or cooked, e.g. species of Ranunculaceae is toxic in green state but can be used as food when dried.

6. Certain plants provide food but under certain conditions produce varying amount of poisonous substance, e.g. potato is a vegetable but at time of sprouting produces dangerous amount of solanine.

7. Certain plants like khesari (*Lathyrus sativus*) give rise to pathological conditions when fed in large doses for prolonged use.

Toxic constituents of the plants

By the metabolic activity the plants not only produce food material but also certain other substances such as alkaloids glycosides, toxic proteins, bitter principles, etc. Many of these constituents are harmful to animal life, at least under certain conditions and the plants containing these principles which are capable of producing harmful effect are known as poisonous plants. These constituents can be divided into different groups:

1. Vegetable Base: It constitutes nitrogenous vegetable bases like amines, purines and alkaloids.

(a) *Amines:* Derived from amino acid and are building materials for proteins. Gives poisonous character to certain mushrooms.

(b) *Purines:* Form active principle of certain tropical plants such as tea, coffee, guaraila.

(c) *Alkaloids:* Alkaloids form the most important group of vegetable base. These are complex heterocyclic nitrogenous compounds having a basic nature and are mostly tertiary amines. These have profound physiological action and in many cases are of intense poisonous nature. These plants contain bitter taste and sufficient protection from being eaten by cattle. Some of the poisonous alkaloids are—aconitine from aconite root,

morphine from poppy capsules, emetine from ipecachuanha root, strychnine from nux vomica seeds, nicotine from tobacco leaves, curarine from curare, etc.

2. Glycosides: These are compounds which when split up with help of acids or enzymes yield a sugar and a carbohydrate known as aglycone. Among the glycosides, one of the important classes is cyanogenetic glycosides. These glycosides are harmless but give rise to toxic acids, e.g. amygdalin found in bitter almonds, phaseolunatin found in flax, prunasin found in wild cherry, etc. Some other glycosides which produce harmful components on hydrolysis are sinigrin in black mustard seeds, sinalbin in white mustard seed. Certain glycosides have direct toxic action such as digitoxin in Digitalis, ceberin in cerebra, thevetin in Thevetia, antiarin in Antiaris.

3. *Saponin:* Occurs in about 400 species belonging to 50 families. They are particularly toxic to cold blooded animals, such as fishes, frogs, insects, etc. Poisonous saponins are known as 'sapotoxins'.

4. *Bitter Principles:* These possess a bitter taste and are found in a number of plants. Bitter principle include the different aloe bitter, which are found in inspissate juice of several species of aloe. These possess a characteristic nauseous and bitter taste and have purgative action, e.g. Santonin—a lactone found in sonic species of Artemrnmisi, Picrotoxin from *Anamirata cocculus*.

5. *Toxic Proteins:* These are also known as toxalbumin and have been observed in Leguminosae and in Euphorbiaceae, e.g. Abrin from *Abrus precatorius*, ricinin from *Ricinus conmmnis*, crotin from *Croton tiglium*. These toxalbumins are essentially blood poisons and are characterized by their property of agglutinating and precipitating the RBC's.

6. *Fixed Oils:* These are compounds of glycerol with different kind of fatty acids containing sterols and other substances dissolved in them when heated they decompose giving of acrid acrolein vapours. These are insoluble in water and sparingly soluble in alcohol, freely soluble in ether, chloroform, benzene, etc. These generally have laxative property. The croton oil expressed from the seeds of *Croton tiglium* produces irritation to the skin; the vesicating action of croton oil is due to resin dissolved in it.

7. *Essential Oils*: These are odourous principles which are generally responsible for the odour of plants. They are generally found in combination with glycosides. They are volatile in steam. They sometime possess sharp burning taste, and locally have an irritating action. Large doses causes irritation to the GIT with diarrhoea, vomiting, pain, etc. They may cause haemorrhage and abortion, e.g. oils of juniper, savin, rue, parsley and pennyroyal. Some plants containing oils with toxic constituents are Artemnisia, Ruta, Mentha, Petroselinum, Anemone, ranunculus, Piper, Ferula, etc.

8. *Organic Acids*: Organic acids significant in poisonous point of view is oxalic acid, aprotoplasmic poison occurring in large number of plants in form of oxalates. Formic acid an irritant is also found in some plants especially in family utricaceae.

Unit 8. Pharmacy management and economics.

Key words: management, developer, supervisor, commercial, challenge, monetary, efficacy, value, product, market, resource, industry, discipline, retail sales, efforts, practical skills, health economics, customer services, quality control

Ex. 1. Read the text about pharmacy management and answer the questions

Health economics is a branch of economics concerned with issues related to efficiency, effectiveness, value and behavior in the production and consumption of health and health care. In broad terms, health economists study the functioning of health care systems and health-affecting behaviors such as smoking. Health economists evaluate multiple types of financial information: costs, charges and expenditures. Pharmacy practice is not an exclusion. Medicines contribute to improving health status, but growth in pharmaceutical expenditure outspaces economic growth. So, it is necessary to conduct sound assessments of pharmacy practice. Attention needs to be paid to financial benefit based on direct cost savings and estimated cost avoidance arising from the prevention of adverse drug effects.

Pharmacy management and economics is an applied discipline focusing on specialized courses in pharmaceutical management, pharmaceutical marketing and product development, quality control, research and technology, economic evaluation of pharmaceutical products.

The goal of pharmacy management is getting information and gaining knowledge as well as practical skills in the field of organization, planning, control, analysis and other activities concerned with providing high quality pharmaceutical care. Keeping up with innovations in customer services, retail sales and human resources policies is essential for any pharmacy owner or pharmacist responsible for training and supervising pharmacy staff. Getting insights from other industries and learning from profiles of pharmacists in a range of pharmacy practice settings is also important.

Pharmacoeconomics refers to the scientific discipline that compares the value of one pharmaceutical drug or drug therapy to another. It is a sub-discipline of health economics. Economic analysis is becoming more and more critical. With growing economic challenges facing the pharmaceutical industry, more efforts are being placed on novel ways that

new drugs can be commercialized in the marketplace. Thus, the technical skills of an economist are needed more than ever to address the growing challenges faced by individual companies and the industry. A pharmacoeconomic study evaluates the cost (expressed in monetary terms) and effects (expressed in terms of monetary value, efficacy or enhanced quality of life) of a pharmaceutical product.

One important consideration in a pharmacoeconomic evaluation is to decide the perspective from which the analysis should be conducted. The cost-benefit analysis (CBA) is based on the economic standard of efficiency. CBA requires the measuring of all benefits and costs which are either directly or indirectly attributable to the outcome under investigation. CBA is important to healthcare economists and policy makers because it identifies inefficiency, and inefficiency equates to welfare loss (ideally, the aim is to minimize welfare loss). CBA has become the standard of modern welfare economics.

The cost-effectiveness analysis (CEA) ratio can be a more practical tool for decision making than CBA in that it involves the comparison of the costs of achieving a particular non-monetary objectives; such as lives saved, health improvement, or quality of life. The Cost Effectiveness Ratio (CER) is the mathematical representation of this analysis.

Answer the questions:

1. What is Pharmacy management and what does it deal with?
2. What is Pharmacoeconomics?
3. What does a pharmacoeconomic study evaluate?
4. What is the difference between the cost-benefit analysis and the cost-effectiveness analysis?

Ex. 2. Read the text about pharmacy management and answer the questions

Key words: chemist, druggist, drug cabinet, dispensary, a chemical substance, over-the-counter medications, behind-the-counter medications, prescription only medicines, a pharmacy medicine, a registered pharmacy, medicines without a prescription, dispense, distribute, dosage, dosage form, interaction, over-the-counter (OTC) drug, pharmacist, storage, store

At a Chemist's

Pharmacy is the field of health sciences focusing on safe and effective use of medications. The word pharmacy derives from Greek "pharmakon", meaning "drug" or "medicine". A place where drugs are dispensed is called a chemist's (shop), or pharmacy, or drugstore. In the USA and Canada drugstores commonly sell not only medicines, but also sweets, cosmetics, magazines, as well as light refreshments and groceries.

There are a lot of different types of pharmacies from clinical or hospital ones (which can be found at hospitals and clinics, of course) to the most exotic ones, like military

pharmacy (where no civil people are allowed to work) or nuclear pharmacy which focuses on preparing radioactive materials for diagnostic tests and for treating certain diseases.

A hospital pharmacy includes special administrative features, provision of drugs for nursing stations, manufacturing of pharmaceutical preparations, teaching of nurses and medical and pharmacy interns, service to the hospital committee on pharmacy and therapeutics, preparation and revision of a hospital formulary, and monitoring the drug regimen of the individual patient (clinical pharmacy). Pharmacies within hospitals differ considerably from community pharmacies. Some pharmacists in hospital pharmacies may have more complex clinical medication management issues whereas pharmacists in community pharmacies often have more complex business and customer relations issues. Hospital pharmacies usually stock a larger range of medications, including more specialized medications.

But the most popular type of chemist's shops is surely community pharmacy. It is the community pharmacy where the dichotomy of the profession exists—health professionals who are also retailers.

The modern community pharmacy has the following areas:

- a dispensary is the area of a pharmacy where drugs are stored and prepared for dispensing and distribution and to which the public has no access;

- a prescription area is equipped with a prescription counter where communication between customers and pharmacists takes place. The patient can buy medicines here by prescription only. These are poisonous, psychotropic, narcotic drugs which are potent and can be dangerous if taken in an overdose.
- a private counseling area is a separate room or part of the room where clients may discuss their personal health issues with qualified pharmacists;
- a waiting area should provide enough space and comfortable seats for those who are waiting for their turn;
- a storage area has space for storing all types of medicines. All the drugs should be stored on or in shelves, drawers of drug cabinets; at that medications for external use are kept separately from internal and injectable drugs and non-prescription preparations.

Apart from medicines you can buy other things and devices at a chemist's like medicine droppers, thermometers, hot water bottles, mustard plasters, sphygmomanometers, scales, etc.

Pharmacists, also known as druggists or chemists, are healthcare professionals who practice in pharmacy, the field of health sciences focusing on safe and effective medication use. Professional interpretation and communication of this specialized knowledge to patients, physicians, and other health care providers are functions which pharmacists provide, and are central to the provision of safe and effective drug therapy.

Historically, the fundamental role of a pharmacist as a healthcare practitioner was to distribute drugs to doctors for treatment of their patients. Nowadays, pharmacists advise patients and health care providers on the selection, dosages, interactions, and side effects of medications, and act as a learned intermediary between a prescriber and a patient. Pharmacists undergo university-level education to understand biochemical mechanisms of action of drugs, drug uses and therapeutic roles, side effects, potential drug interactions, etc.

Different countries require pharmacists to hold either a Bachelor of Science in Pharmacy or Doctor of Pharmacy degree.

The most common pharmacist positions are that of a community pharmacist (also referred to as "retail pharmacist", "first-line pharmacist" or "dispensing chemist"), or a hospital pharmacist, where they instruct and counsel on the proper use and adverse effects of medically prescribed drugs and medicines. In most countries, the profession is subject to professional regulation. Pharmacists may also practice in a variety of other settings, including industry, wholesaling, research, academia, military, and government. Pharmacists are highly-trained and skilled healthcare professionals who perform various

roles to ensure optimal health outcomes for their patients. Many pharmacists are also small-business owners, owning the pharmacy in which they practice.

Answer the questions

1. What is a chemist's?
2. Who works at a chemist's? What is their role?
3. What types of pharmacy do you know?
4. What areas does a community pharmacy have?
5. Where can you buy medicines by prescription? What drugs are sold by prescription only?

Ex. 3. Finish the sentences by replacing the Russian words in parentheses with their English equivalents.

1. The (фармацевтический) service in our country is an inseparable part of the health protection.
2. In the hall you can see special glass (прилавки).
3. On the stalls and shelvings you can find all kinds of (успокоительных средств), vitamins and (перевязочный материал).
4. In the chemist's department you can buy (принадлежность) for personal hygiene and even (парфюмерия).

Ex. 4. Translate these sentences into English

1. В любой аптеке все лекарственные средства хранят в лекарственных шкафчиках.
2. В рецептурном отделе можно заказать лекарство по рецепту.
3. В отделе ручной продажи вы можете купить лекарственное средство сразу же.
4. Все сильно действующие лекарства хранят в лекарственных ящиках, маркированных буквой В.

Ex. 5. Translate these sentences into Russian

1. A pharmacist gives advice on taking a medicine.
2. Medicines reduce pain.
3. A vast majority of people take great benefits from medicines.
4. Nowadays doctors don't prescribe this drug very often.
5. A pharmacist keeps all poisonous drugs in a drug cabinet marked with a big letter A.

Ex. 6. Read the text and answer the questions

At the English drug store

One day I was playing cricket in the field and was catching the ball, right on the nose. The strike was so heavy that I was given a bloody nose and was in shock. I was given the first medical aid but in a short while I went to the doctor. He gave me a

prescription to take to the chemist's. I had a headache and was suffering from shock so he gave me a nerve tonic and aspirin.

I entered the chemist's shop and came to the prescription department.

I: How do you do?

Chemist: How do you do. May I please have your prescription…You have two items so you must pay four shillings, two shillings for each item.

I: Why is not the chemist's service free in England?

Chemist: When it was free, doctors were wasteful. They prescribed medicines that people didn't need. Here's your medicine. Take it three times a day according to the doctor's advice.

I: Thank you but I would like to buy a couple of other things. May I have two bars of soap, a tube of brushless shaving cream and a packet of razor-blades.

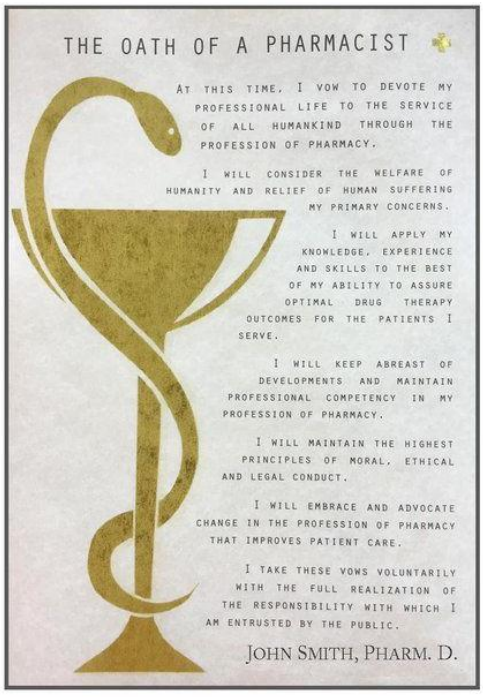
Chemist: 10 shillings, please… Just a minute. Let me pack your things. Here they are.

I: Thank you. Goodbye.

Chemist: You are welcome sir. Have a nice day.

Answer the questions

1. What happened to the man?
2. Why did he come to the chemist's shop?
3. What was the chemist's advice?
4. What other things did the man buy?



Ex. 7. Read the text bout pharmaceutical ethics

Oath of a Pharmacist

At this time, I vow to devote my professional life to the service of all humankind through the profession of pharmacy.

I will consider the welfare of humanity and relief of human suffering my primary concerns.

I will apply my knowledge, experience, and skills to the best of my ability to assure optimal drug therapy outcomes for the patients I serve.

I will keep abreast of developments and maintain professional competency in my profession of pharmacy. I will maintain the highest principles of moral, ethical and legal conduct.

I will embrace and advocate change in the

profession of pharmacy that improves patient care.

I take these vows voluntarily with the full realization of the responsibility with which I am entrusted by the public.

Pharmacist code of ethics

Pharmacists are health professionals who assist individuals in making the best use of medications. This Code, prepared and supported by pharmacists, is intended to state publicly the principles that form the fundamental basis of the roles and responsibilities of pharmacists. These principles, based on moral obligations and virtues, are established to guide pharmacists in relationships with patients, health professionals, and society.

I. A pharmacist respects the covenantal relationship between the patient and pharmacist.

II. A pharmacist promotes the good of every patient in a caring, compassionate, and confidential manner.

III. A pharmacist respects the autonomy and dignity of each patient.

IV. A pharmacist acts with honesty and integrity in professional relationships.

V. A pharmacist maintains professional competence.

VI. A pharmacist respects the values and abilities of colleagues and other health professionals.

VII. A pharmacist serves individual, community, and societal needs.

VIII. A pharmacist seeks justice in the distribution of health resources.

Ex. 8. Write a short essay about the ethical problems that a pharmacist may face when working in a pharmacy

Unit 9. Drugs, Medications and Medicines.

Key words: analgesic, anaesthetic, anticoagulant, antiemetic, antihistamine, antihypertensive, anti-infective, anti-inflammatory, antineoplastic, cutaneous, diuretic, eliminate, generic name, hypnotic, intramuscular, intravenous, nausea, orally, painkiller, psychotropic, rectal, relieve, sedative, side effect, sublingual, trade name, vomiting

Ex. 1 Read the text

What is a drug, a medication, a medicine?

A drug is a substance which may have medicinal, intoxicating, performance enhancing or other effects when taken or put into a human body and is not considered a food or exclusively a food.

What is considered a drug rather than a food varies between cultures. In pharmacology, a drug is "a chemical substance used in the treatment, cure, prevention, or diagnosis of disease or used to otherwise enhance physical or mental well-being." Drugs may be prescribed for a limited duration, or on a regular basis for chronic disorders.

Drugs are usually distinguished from endogenous biochemicals by being introduced from outside the organism. For example, insulin is a hormone that is synthesized in the body; it is called a hormone when it is synthesized by the pancreas inside the body, but if it is introduced into the body from outside, it is called a drug. Many natural substances, such as beers, wines, and psychoactive mushrooms, blur the line between food and recreational drugs, as when ingested they affect the functioning of both mind and body.

A pharmaceutical drug, also referred to as a medicine or medication, can be loosely defined as any chemical substance - or product comprising such - intended for use in the medical diagnosis, cure, treatment, or prevention of disease.

A medication or medicine is a drug taken to cure and/or ameliorate any symptoms of an illness or medical condition, or may be used as preventive medicine that has future benefits but does not treat any existing or pre-existing diseases or symptoms.

Medication

A drug is a substance that changes body functions. It is used in the diagnosis, treatment and prevention of disease in humans. Traditionally, drugs were derived from natural plants, animals, and mineral sources.

Today, most are manufactured synthetically by pharmaceutical companies. A few, such as certain hormones and enzymes are produced by genetic engineering.

One of the most striking qualities of drugs is the diversity of their actions and effects on the body. Depending on their effect on the body, the drugs are divided into different categories, for example:

- analgesics (painkillers) relieve pain;
- anaesthetics reduce or eliminate pain;
- anticoagulants prevent coagulation and formation of blood clots;
- antiemetics relieve symptoms of nausea and prevent vomiting;
- antihistamines are used when treating allergies;
- antihypertensive drugs lower blood pressure;
- anti-inflammatory drugs counteract inflammation and swelling;
- anti-infective drugs kill or prevent the growth of infectious organisms;
- antineoplastics destroy cancer cells;
- diuretics promote excretion of water;
- sedatives/hypnotics induce relaxation, sleep;
- psychotropics affect the mind changing mental activity, state or behaviour; etc.

Drugs are introduced into the body by several routes. They may be taken by mouth (orally); given by injections into a vein (intravenously), into a muscle (intramuscularly), or beneath the skin (subcutaneously); placed under the tongue (sublingually); inserted in the rectum (rectally) or vagina (vaginally); instilled in the eye (by the ocular route);sprayed into the nose and absorbed through the nasal membranes (nasally); breathed into the lungs, usually through the mouth (by inhalation); applied to the skin (cutaneously). Each route has specific purposes, advantages, and disadvantages.

Most drugs have potential adverse effects or side effects, i.e., any secondary, undesirable effect. In addition there may be contraindications, or reasons not to use a particular drug for a specific individual based on that person's medical conditions, current medications, sensitivity, or family history.

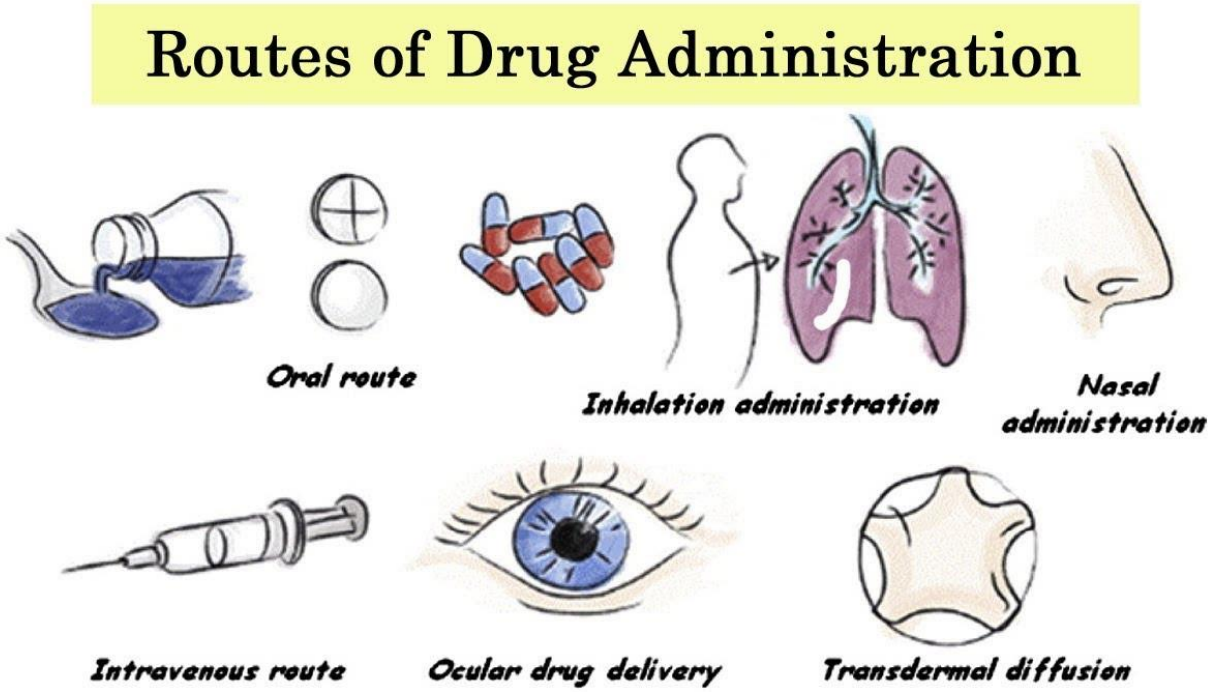
Because drugs given in combination may interact, they produce a greater effect than either of the drugs acting alone. They may also react adversely with certain foods or substances, such as alcohol or tobacco. The real challenge for a physician is to take into account all these possibilities and to administer the most effective treatment for each patient.

Off-label use (нарушение инструкции по применению) is the practice of prescribing pharmaceuticals for an unapproved indication or in an unapproved age group, unapproved dose or unapproved form of administration. Off-label use of medications is very common. Some drugs are used more frequently off-label than for their original indications. Generic drugs generally have no sponsor as their indications

and use expands, and incentives are limited to initiate new clinical trials to generate additional data for approval agencies to expand indications of proprietary drugs. Up to one-fifth of all drugs are prescribed off-label and amongst psychiatric drugs, off-label use rises to 31%.

In general, drugs are of vital importance today. Thus, Ann Halliday, a journalist, calls them one of the seven wonders of the modern world. She thinks that nothing has done more for the comfort and happiness of the mankind than the advance of medical knowledge! Humble penicillin has saved millions of lives. Smallpox and poliomyelitis are now virtually extinct. Illnesses such as diabetes, hypertension, and mental depression are effectively controlled with modern drugs. Average life expectancy in Europe has risen dramatically over the last hundred years, from about 50 years in 1906 to about 75 years today.

Drug administration



Medicines and other chemicals, for both diagnostic and therapeutic reasons, and for purposes such as immunization or anaesthesia, can be administered in a wide variety of ways. The aim of therapeutic administration is for the active components of the medicine to reach the target site where it is intended to be effective. The technique and route used, such as an injection into a muscle, application of a cream to the skin, or ingestion of a pill, are influenced by both the formulation of the compound and the desired site and rapidity of action.

Injection and infusion

Injection is the act of introducing a substance into a body by means of some impulsive force, usually employing a syringe. The substance so injected is usually in a liquid form, and is employed to have a therapeutic effect either at the site of application or elsewhere in the body. Injected drugs usually act faster than those taken by mouth — and some substances, such as insulin, need to be injected, because they would be destroyed in the gut.

Infusion usually into a vein, but also sometimes into a body cavity, differs from injection in being a continuous, slow introduction of material, usually under pressure of gravity (as in a blood or saline infusion, or transfusion), and sometimes by a slow, mechanically-driven syringe. Materials to aid diagnosis, such as radioactive chemicals, or radioopaque dyes which show up on X-ray, are injected or infused, most commonly into veins or arteries.

Oral medication

Drugs to be given by mouth are produced in a wide array of formulations, including tablets, pills, and liquids. Aspirin, and also alcohol, are absorbed in the stomach, but most oral medications are designed to be absorbed in the small intestine, where nutrients are normally absorbed, and they are coated with a protective material so that they pass through the stomach intact. 88

Other routes

Some drugs are best absorbed through mucous membranes — such as the lining of the mouth, especially under the tongue — one of the best known being nitroglycerine for angina. Other sites for absorption can include the rectum, urethra, or nasal cavity. Ointments are preparations of a fatty or oily consistency, for the application of medicines to the skin or mucous membranes, and are intended either to exert a local effect — such as warming, cooling, pain relief, anti-infection; or to provide a protective barrier.

Few drugs penetrate readily through the layers of the skin. Absorption is determined by both the surface area over which an ointment is spread, and the solubility of the ointment. Some chemicals, such as toxic substances in organic solvents, can be absorbed rapidly through the skin and cause poisoning.

Some drugs can be delivered by inhalation, in the form of vapours or aerosols. They can be absorbed rapidly into the circulation through the pulmonary epithelium — the lining of the lungs. This route is used particularly for the treatment of respiratory diseases, such as asthma, and for the administration of volatile anaesthetics.

Drug names

Drug nomenclature is the act of creating names for a drug or other pharmaceutical substance. Drugs may be called by either their generic or their trade names. A generic name is usually a simple version of the chemical name for the drug and is not capitalized (e.g., lidocaine hydrochloride). The trade name (brand name, proprietary name) is a registered trademark of the manufacturer and is written with an initial capital letter. The same drug may be marketed by different companies under different trade names.For the above mentioned drug these include Akten, Anestafoam, Lida Mantle, Lidocaine, Lidocream, Lidoderm, Topicaine, Xylocaine, etc.

So, drugs, in the majority of circumstances, have 3 names: the chemical name, the International Nonproprietary Name (INN, also known as the generic or nonproprietary name), and the brand name.

Sample of different drug names

Chemical Name	Generic Name	Brand Name
N-acetyl-p-aminophenol	Acetaminophen	Tylenol

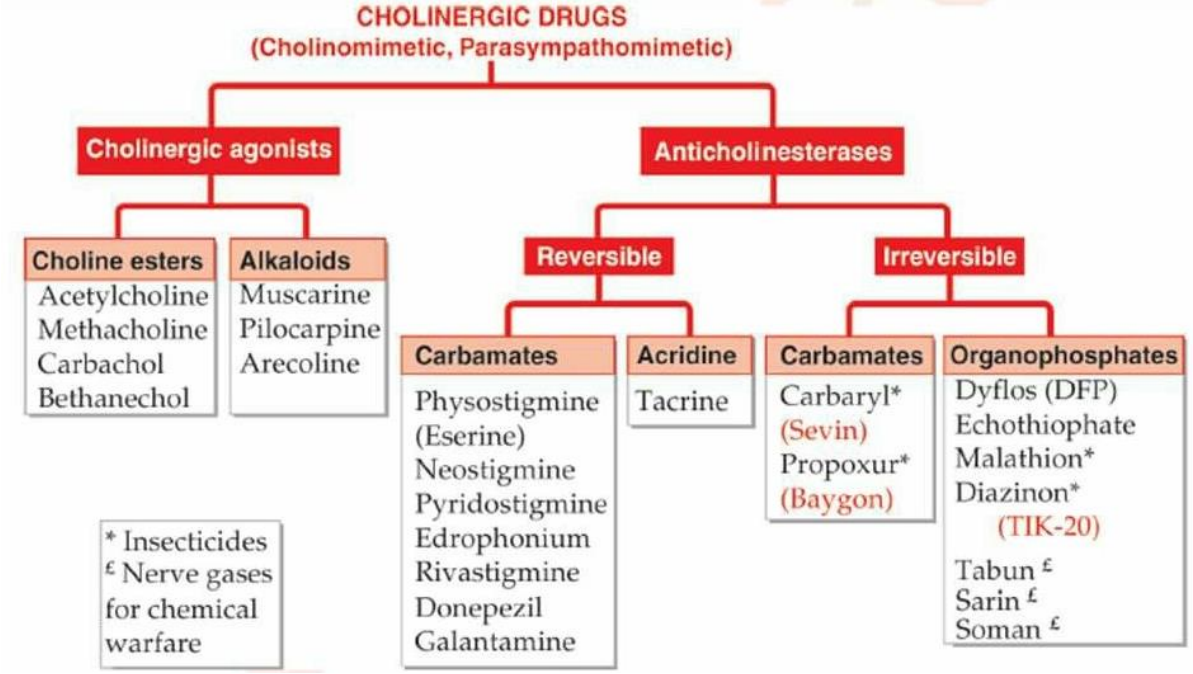
The chemical name is the scientific name, based on the molecular structure of the drug. These names are typically very long and too complex to be commonly used in referring to a drug.

Generic name is constructed out of affixes that classify the drugs into different categories and also separate drugs within categories. A marketed drug might also have a company code or compound code. Internationally, generic names, known as the International Nonproprietary Name, are issued by the World Health Organization (WHO) in several languages, including English. Generic names are used for a variety of reasons. They provide a clear and unique identifier for active chemical substances, appearing on all drug labels, advertising and other information about the substance. The prefixes and infixes have no pharmacological significance and are used to separate the drug from others in the same class. Suffixes or stems may be found in the middle or more often the end of the drug name, and normally suggest the action of the drug. Generic names often have suffixes that define what class the drug is.

Brand is the "name, term, design, symbol, or any other feature that identifies one seller's product distinct from those of other sellers". In pharmacy, the brand name (trade name) is a commercial name for a drug, normally the property of the drug manufacturer.

Drug classes

A drug class is a group of medications that may work in the same way, have a similar chemical structure, or are used to treat the same health condition. A drug may be classified by the chemical type of the active ingredient or by the way it is used to treat a particular condition. Each drug can be classified into one or more drug classes.



Drugs are classified according to their effect on particular body systems, their therapeutic uses, and their chemical characteristics. A class of drugs is a group of drugs that have similar characteristics; they may cure the same diseases, have similar chemical structures or work in the same way. Example: morphine can be classified as a central nervous system depressant and a narcotic or opioid analgesic.

The names of therapeutic classifications usually reflect the condition for which the drugs are used (e.g., antidepressants, antihypertensives).

Sometimes, the names of many drug groups reflect their chemical characteristics rather than their therapeutic uses (e.g., adrenergics, benzodiazepines). Many drugs fit into multiple groups because they have wide-ranging effects on the human body.

There are several cases where a drug can have multiple classes, either by indication, mechanism of action, or route of administration. Additionally, drugs can also be classified 3 different ways: – By body system – By the action of the agents – By the drug's mechanism of action.

It is important to keep in mind that the effects produced by any drug can vary significantly and is largely dependent on the dose and way that it is administered. Concurrent use of other drugs can enhance or block an effect and substance abusers often take more than one drug to boost the desired effects or counter unwanted side effects. This means that the risks involved with drug abuse cannot be accurately predicted because each user has his or her-own unique sensitivity to a drug.

Ex. 2. Answer the questions

1. What is a drug?
2. What names do drugs have? What do their names mean?
3. What are drugs made of?
4. What types of drugs do you know? What is their effect on the body? Give examples.
5. How are drugs introduced into the body?
6. What is a side effect?
7. What may change the effect of drug?
8. Why are drugs so important in our life? Give the examples.
9. What diseases have been eliminated due to drugs?

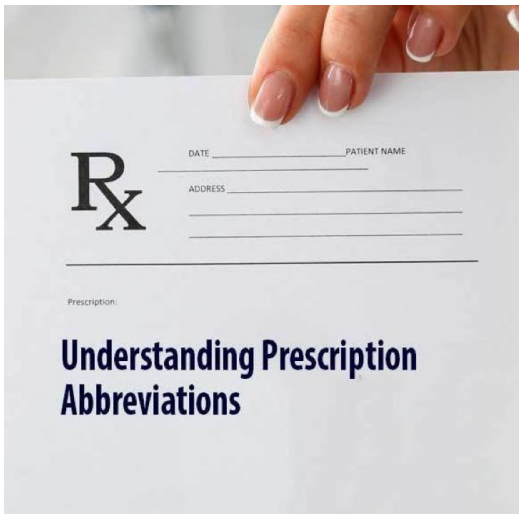
Ex. 3. Find definitions for these words and phrases:

1. side effect	**a.** written or signed order for a drug with directions for administration
2. dosage	**b.** a person who helps in diagnosing or preventing or treating illness
3. prescription	**c.** an amount of drug or medicine to be taken at one time or over a period
4. overdose	**d.** an undesirable effect
5. health care provider	**e.** an excessive and dangerous dose of a drug
6. chemist	**f.** a person authorized to dispense medicinal drugs

Ex. 4. Finish the sentences using the words from the table, synonyms for which are given in parentheses

side effects	dose	interacts
pills	druggist	capsule
chemist's	suppository	overdose

1. The maximal _____ of paracetamol for an adult is 4 g daily. (amount)
2. A patient took a _____ which had a measured amount of medicine inside. (a small container)
3. The majority of medicines may have _____ _____ . (bad effects)
4. A _____ should be placed into the rectum and left to dissolve gradually. (a small piece of solid medicine)
5. Some women take _____ to avoid pregnancy. (tablets)
6. She was admitted to hospital after taking an _____ of sleeping pills. (too much of a drug)
7. Perfume _____ with the skin's natural chemicals. (has an effect)
8. My friend is a _____, his job is to prepare and sell medicines. (chemist)
9. You can buy medicine droppers, mustard plasters, thermometers, scales and other things at a _____ (drugstore).



Ex. 5. What do these abbreviations mean?

1. cap	a. prescription
2. elix	b. tablet
3. MED(s)	c. suspension
4. OTC	d. tincture
5. Rx	e. ointment
6. supp	f. elixir
7. susp	g. infusion
8. tab	h. over-the-counter
9. tinc	i. suppository
10. ung	j.medicine(s)
11. infus	k. capsule
	l. medication(s)

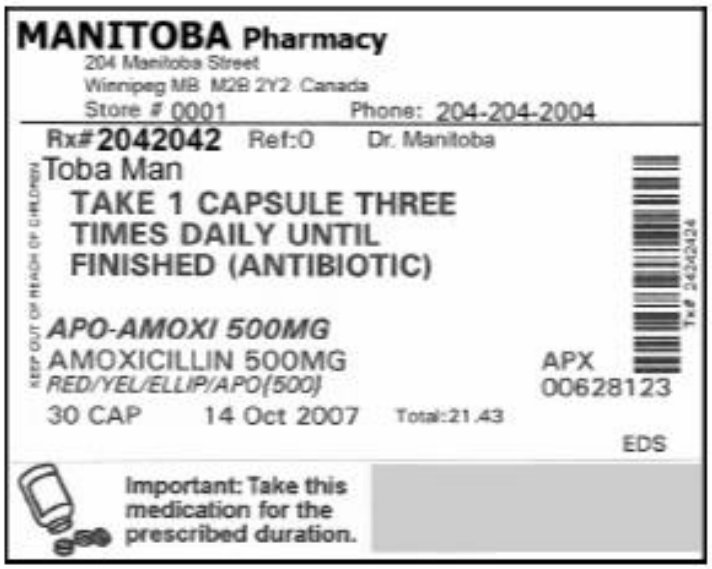
Ex. 6. Make phrases with words from the table. Use each word only once.

safe fundamental potential	external injectable non-prescription	counselling potent	common radioactive

1._____ dosage
2._____ preparation
3._____ drug
4._____ use
5._____ area

6._____ medicine
7._____ drug interaction
8._____ role
9._____ material
10._____ use

Ex. 7 Look at the recipe; then answer the questions.



1. What is the name of the pharmacy?
_____Pharmacy
2. What is the address of the pharmacy?
204 Manitoba _____, Winnipeg MB M2B 2Y2, Canada
3. What is the store number of the pharmacy?
Store: ____0001
4. What is the phone number of the pharmacy?
Phone: _____

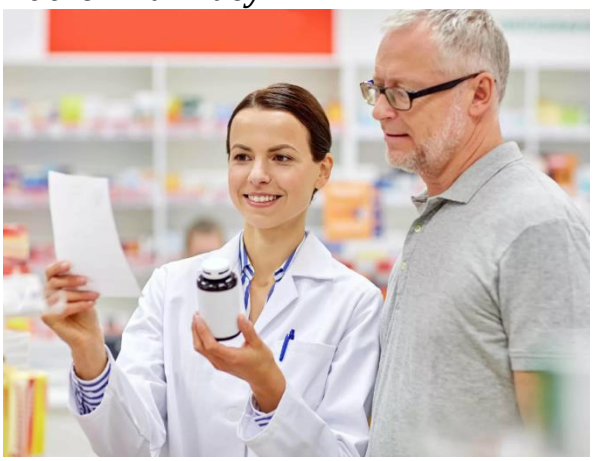
5. What is the prescription number?
Rx: # _____
6. What is the physician's name?
Dr. _____
7. What is the date that the prescription was filled?
_____ 14, 2007
8. What is the name of the person for whom the drug is prescribed?
Toba _____
9. What is the brand name of this drug?
APO-_____
10. What is the name of the medication or the main ingredient (generic name)?
_____ is the generic _____ for the drug.
11. What is the strength of the medication?
_____ mg
12. What do the letters APX mean?
The _____ indicate the manufacture's/company's code.
13. What does the number listed below the company code represent?
The _____ indicates the drug identification number (DIN).
14. How much is in the package?
_____ caps (capsules)
15. What are the directions or instructions for taking the medication?
_____1 capsule _____times daily until _____ (antibiotic).

16. Are there any cautions or warnings on the label?
Important: Take this medication for the _____.

Ex. 8 Read the recipe. Using this information, end the dialog.

Generic name: Aspirin
Therapeutic classification: Analgesic
Indication: pain, heart attack, fever
Contraindication: blood disorder, liver or kidney impairment, hypersensitivity.
Pregnancy Category: D (potential benefits may warrant use of the drug in pregnant women despite potential risks.
Dosage: 325-650 mg 4-6 hourly. Max: 4g/day
The way of taking: It comes as a tablet to take by mouth, with food.
Warnings and Precautions: caution in patients with stomach pain, ulcers, anemia, kidney or liver diseases, allergy.
Avoid alcohol consumption.
It should not be given to children.
Side effects: nausea, vomiting, stomach pain, allergic reactions.
Storage condition: store it at room temperature.

At the Pharmacy



Customer: Can you help me? I need Aspirin.
Pharmacist: _____
C: I have a headache. What is the action of Aspirin? Can I get a relief?
Ph: _____
C: How should I take it?
Ph: _____
C: Can I take it with food?
Ph: _____
C: Can I drink alcohol?
Ph: _____
C: What is the dosage of the drug?
Ph: _____
C: Can it be taken by children and pregnant women?
Ph: _____
C: What are possible precautions?
Ph: _____
C: Should I expect any side effects?
Ph: _____

Ex. 9. Remember the meaning of these word elements.

Word Part	Meaning	Example
PREFIXES		
anti-	against	anti-inflammatory

		anti-infectious
contra-	against	contraindication contraceptive
counter-	opposite	counterpoison counterdepressant
SUFFIXES		
-lytic	dissolving reducing loosening	anxiolytic – agent reducing anxiety
-tropic	acting on	inotropic – acting on the force of muscle contraction (*in/o* means *fiber*)
ROOTS		
alg/o, algio algesi/o	pain	algesic - painful
chem/o-	chemical	chemotherapy – treatment with drugs
hypno-	sleep	hypnosis – a mental state like sleep in which a person's thoughts are easily influenced by smb
pyr/o-, pyret/o	fever	antipyretic – counteracting fever
tox/o, toxic/o	poison, toxin	toxic - poisonous
vas/o	vessel	vasomotor – changing vessel diameter

Standardized drug suffixes:

-vir	Antiviral drug	Indinavir
-cillin	Antibiotics	Penicillin and related compounds such as Carbenicillin and Oxacillin
-mab	Monoclonal antibodies	Trastuzumab, used in chemotherapy
-olol	Beta-1 blocker	Alprenolol
-tidine	H_2 receptor antagonist	Cimetidine, Ranitidine
-pine	Ca^{2+} channel blocker	Amlodipine, Nifedipine
-done	Opioid analgesic	Hydrocodone, Oxycodone, Methadone
-sone	Corticosteroid, antiinflamatory	Prednisolone, Prednisone
-nitrate	Vasodialator	Isosorbide mononitrate, Isosorbide dinitrate

Ex. 10. Make sentences from these words, placing them in right order.

1. day / needs / take / a / to / meals / two / twice / she / tablets / before.

_____

2. Smith / what / is / for / Penicillin / necessary / dosage / of / Mr?

_____

3. medicine / he / often / need / does / his / how?

_____

4. each / drop / should / twice / put / one / into / eye / a / be / day.

_____

Ex. 11. Explain the meaning of these abbreviations used when prescribing medicines.

The frequency of drugs:	
ac	before meals (Latin, *ante cibum*)
pc	after meals (L., *post cibum*)
bid	twice a day(L., *bis in die*)
tid	three times per day (L., *ter in die*)
qid	four times a day (L., *quarter in die*)
qd	every day (L., *quaqer die*)
qh	every hour (L., *quaqer hora*)
1-4h	every 4 hours
prn	as needed, as required (pro re nata)
The route of administration	
IM	intramuscular(ly)
IV	intravenous(ly)
SC	subcutaneous(ly)
PO	by mouth
PR	(per rectum) by rectum
INH	by inhalation
Measurements	
mg	milligram
µg	microgram
ml	millilitre

Ex. 12. Choose the appropriate definition for each term.

1. sedative
2. antiemetic
3. antineoplastic
4. psychotropic
5. syringe
6. ampule
7. emulsion

a. relieving nausea
b. an instrument for injecting fluid
c. a mixture of liquids
d. a small glass container for liquid medicine
e. causing relaxation
f. agent that destroys cancer cells
g. acting on the mind

Ex. 13. Write a term for each definition:

1. counteracting fever - _____
2. dissolving blood clots - _____
3. one who prepares, sells or dispenses drugs - _____
4. one who studies poisons - _____
5. using drug through the skin - _____
6. the way of breathing in the drug through the mouth _____

Ex. 14. Choose the most appropriate answer:

1. Another term for trade name is:

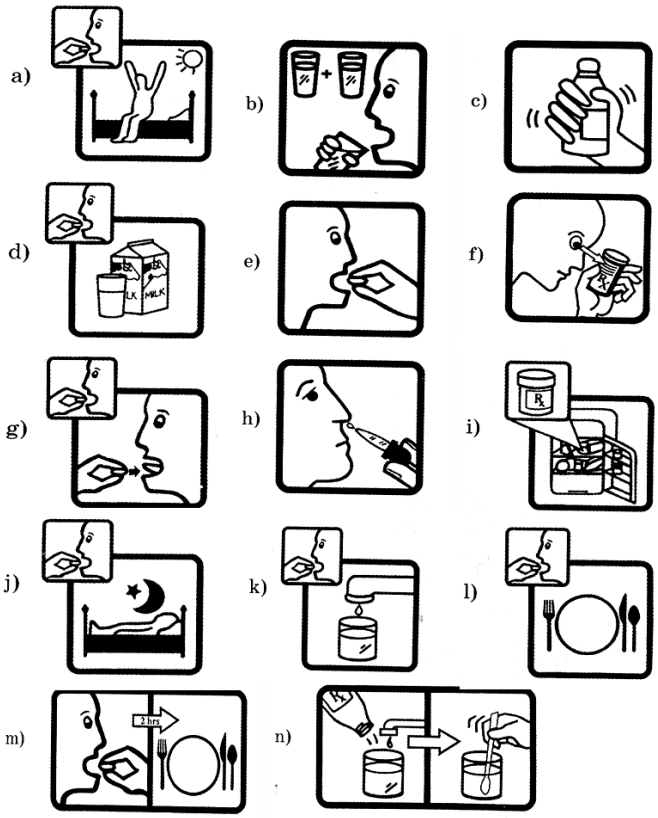
a. indicated name

b. generic name
c. prescription name
d. chemical name
e. brand name

2. An analgesic is used to treat:
a. diarrhea
b. arrhythmia
c. psychosis
d. pain
e. thrombosis

3. A drug that is administered cutaneously is:
a. inserted with the catheter
b. placed under the tongue
c. applied to the skin
d. injected
e. swallowed

4. Drug administered by injection is described as:
a. partial
b. instilled
c. encapsulated
d. bolus
e. parenteral



Ex. 15. Select the pictograms for the following recommendations for the use of medicines:

1. Read the label.
2. Shake well.
3. Store in refrigerator.
4. Take by mouth.
5. Take with glass of water.
6. Take with milk.
7. Take with meals.
8. Take in the morning.
9. Take at bedtime.
10. Take two hours before meals.
11. Dilute with water.
12. Drink additional water.
13. Dissolve under the tongue.
14. Place drops in nose.

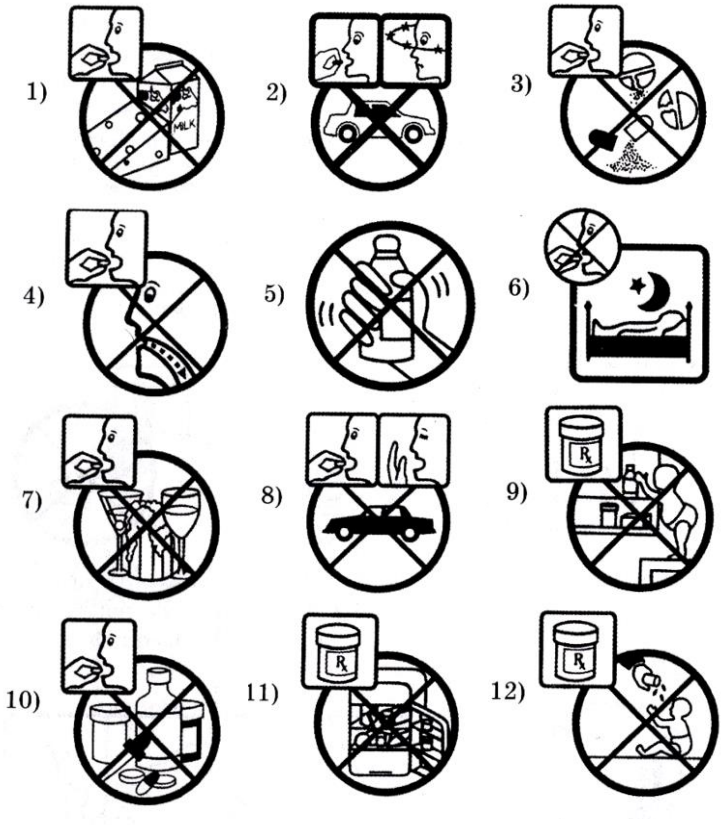
1	2	3	4	5	6	7	8	9	10	11	12	13	14
f													

Ex. 16. Complete the sentences using the names of the drug groups from the table

a painkiller	an antibiotic	a supplement
a sedative	an inoculation	a laxative
a stimulant		an antihistamine
an anti-inflammatory		an antidepressant

1. _____ kills bacteria and other germs.
2. _____ relieves pain.
3. _____ reduces swelling.
4. _____ encourages bowel movements.
5. _____ provides a substance that the body lacks.
6. _____ treats allergies.
7. _____ increases activity in the body.
8. _____ reduces feelings of extreme sadness.
9. _____ makes you relaxed and sleepy.
10. ____protects you against infectious diseases.

Ex. 17. **Correlate the pictograms and instructions on what not to do when taking medications.**



a. Do not swallow.
b. Do not shake.
c. Do not refrigerate.
d. Do not take at bedtime.
e. Do not give medicine to babies.
f. Do not drink alcohol while taking this medicine.
g. Do not take other medicines with this medicine.
h. Do not take milk with or other dairy products.
i. Do not store medicine where children can get it.
j. Do not break or crush tablets or open capsules.
k. Do not drive if this medicine makes you sleepy.
l. If this medicine makes you dizzy, do not drive.

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
h											

Unit 10. Pharmacy technology, industry and manufacturing.

Key words: pharmaceutical industry, pharmaceutical manufacturing, drug manufacturing, drug development, drug discovery, exclusive rights, pharmaceutical expenditure, industrial-scale synthesis, milling, granulation, coating, tablet pressing, shapes of tablets, Food and Drug Administration, Pharmacopeia, The National Formulary, Hospital Formulary

Ex. 1 Read the text about the pharmaceutical manufacturing

Pharmacy technology

Pharmacy technology is an important part of the health care system. It is the application of scientific knowledge, techniques and methods to the practice of pharmacy or pharmacology. Pharmaceutical technology focuses on improving the safety, quality and efficiency of pharmaceutical manufacturing through the application of relevant technology.

New technologies have the potential to make pharmacy practice and pharmaceutical care more efficient, more cost-effective and more patient-friendly. Robots, networked computers and other tools are making pharmacists and pharmacy technicians more productive and accurate. Automating the pick, pour, count, fill and label steps of the prescription order filling process can increase pharmacy productivity.

Pharmaceutical industry

The pharmaceutical industry develops, produces, and markets drugs or pharmaceuticals licensed for use as medications. The pharmaceutical industry includes public and private organizations involved in the discovery, development, and manufacture of drugs and medications. Historically, medicines were prepared by physicians and later by apothecaries.

Today, drug development relies on the collaboration and effort of highly trained scientists at universities and private companies. The modern era of drug discovery and development originated in the 19th century when scientists learned how to isolate and purify medicinal compounds and developed large-scale manufacturing techniques. As understanding of biology and chemistry improved in the 20th century, the occurrence and severity of such diseases as typhoid fever, poliomyelitis, and syphilis were greatly reduced.

While many drugs, such as quinine and morphine, are extracted from plant substances, others are discovered and synthesized by techniques including combinatorial chemistry and recombinant DNA technology.

Most of today's major pharmaceutical companies were founded in the late 19th and early 20th centuries. Key discoveries of the 1920s and 1930s, such as insulin and penicillin, became mass-manufactured and distributed. Switzerland, Germany and Italy had particularly strong industries, with the United Kingdom, the United States, Belgium and the Netherlands following suit. Numerous new drugs were developed during the 1950s and mass-produced and marketed through the 1960s. Drug development progressed from a hit-and-miss approach to rational drug discovery in both laboratory design and natural-product surveys. Demand for nutritional supplements and so-called alternative medicines created new opportunities and increased competition in the industry.

Medications are typically produced by pharmaceutical companies and are often patented to give the developer exclusive rights to produce them. Those that are not patented (or with expired patents) are called generic drugs since they can be produced by other companies without restrictions or licenses from the patent holder.

The pharmaceutical industry has greatly aided medical progress, and many new drugs have been discovered and produced in industrial laboratories.

About the UK pharmaceutical industry

Medicines contribute enormously to the health of the nation. The discovery, development and effective use of drugs have improved many people’s quality of life, reduced the need for surgical intervention and the length of time spent in hospital and saved many lives. The industry which has produced these drugs has understandably been described as “world class and a jewel in the crown of the UK economy”. It is the third most profitable economic activity after tourism and finance and a centre of world class science, accounting for 10% of global pharmaceutical expenditure. However, there are disadvantages in the increasing use of and reliance on medicines. The inappropriate or excessive use of medicines can cause distress, ill-health, hospitalization and even death. Adverse drug reactions are responsible for about 5 % of all admissions to hospitals in the UK. The interests of pharmaceutical companies and those of the public, patients and the National Health Service (NHS) often overlap but they are not identical.

Pharmaceutical manufacturing

Drug manufacturing is the process of industrial-scale synthesis of pharmaceutical drugs by pharmaceutical companies. The drug manufacturing industry has produced a variety of medicinal and other health-related products undreamed of by even the most imaginative apothecaries of the past. These drugs have saved the lives of millions of people from various diseases, and they permit many ill people to lead reasonably normal lives.

In the future, pharmaceutical manufacturing will need to employ innovation, cutting edge scientific and engineering knowledge, and the best principles of quality management to respond to the challenges of new discoveries (e.g. complex drug delivery systems and nanotechnology) and ways of doing treatments such as individualized therapies or genetically tailored treatments.

The process of drug manufacturing can be broken down into a series of unit operations, such as milling, granulation, coating, tablet pressing, and others.

During the drug manufacturing process, milling is often required in order to reduce the average particle size in a drug powder. Granulation can be thought of as the opposite of milling; it is the process by which small particles are bound together to form larger particles, called granules.

An enteric coating is a polymer barrier applied on oral medication. This helps by protecting drugs from the pH (i.e. acidity) of the stomach. Drugs that have an irritant effect on the stomach, such as aspirin, can be coated with a substance that will dissolve only in the small intestine.

A tablet press is a mechanical device that compresses powder into tablets of uniform size and weight. A press can be used to manufacture tablets of a wide variety of materials, including pharmaceuticals, cleaning products, and cosmetics.

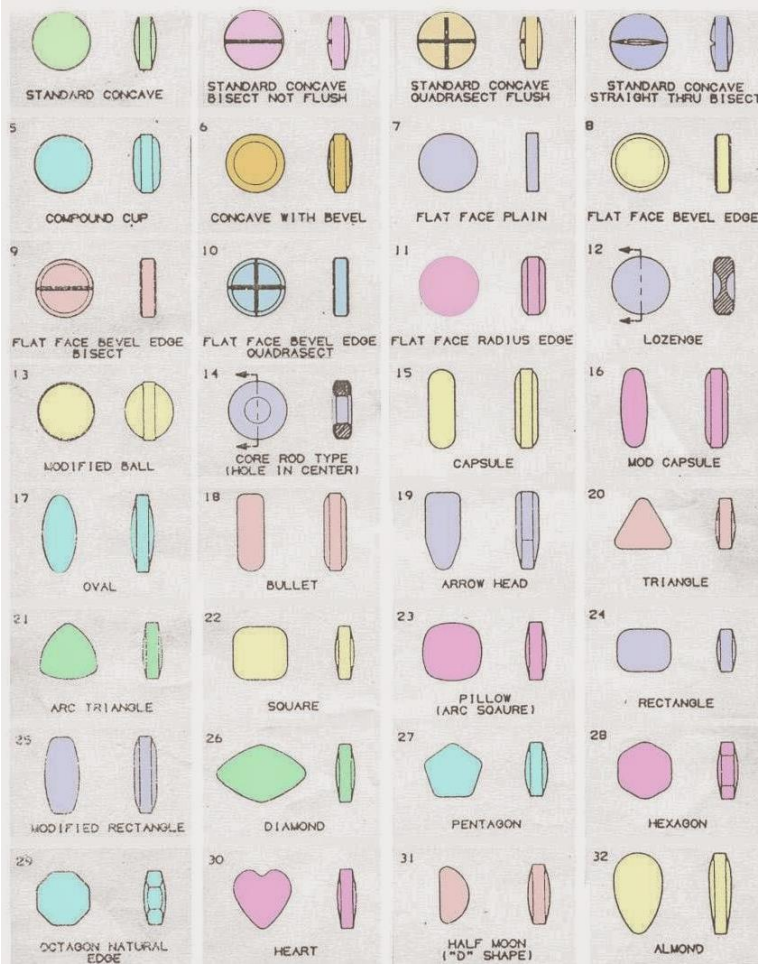
Preparation of tablets

One knows that a tablet is the most common form of medication for the administering of drugs in a dry state. Its preparation constitutes an important part of modern “Pharmaceutical Technology”. The method of tablet making or tabletting is defined as a process of pressure of powdered medicine.

It is generally observed that some tablets are made easier from certain drugs than from other ones. For example, sodium chloride is used without the addition of auxiliary substances. But for lactose the addition of such substances is necessary to overcome certain difficulties. It is interesting that in the process of tabletting some materials are continuously binding and sticking in the special machine. Sticking takes place when there is too much moisture in the granules because of insufficient drying, etc.

The application of different pressure during tabletting plays a very great role. It is important that tablets which are being dissolved slowly by saliva in the mouth are more strongly compressed than other ones using for common internal administration. Another important effect of higher pressures is an increase of friction which causes the use of greater amount of lubricating and gliding substances, such as natural starch. The use of starch as an auxiliary component in tablet making is generally recognized. It was stated that starches possessed very good gliding properties and didn't show any lubricating action.

Shapes and sizes of tablets



A great variety of shapes and sizes is available among medical tablets. One knows that the most common shape of the tablet is a circular body with flat or slightly convex sides. In the Scandinavian countries where the Pharmacopoeia provides official specification of formula, the method of tablet making, the size and shape are also specified officially. In selecting of particular shapes and sizes the primary consideration is ethical. It is generally recognized that prepared tablets must have a pleasing appearance. It is important that the tablet for making solutions is required to dissolve as quick as possible. This will require a larger diameter than average tablets of the same weight. A tablet for oral using should be flat and thick enough. While it is slowly dissolving in the mouth the patient will feel a pleasant lasting sense. The efficiency of the tablet depends on this effect.

Similarly, coated tablets which have a more convex shape are harder than other ones. It is more convenient to have the thinnest edges because it is easier to cover a thin edge during the coating process. In addition, it was found that preparing of very convex tablets was more difficult. The density of compressing substance is also important factor. Thus a lighter and less dense material needs a bigger punch – press machine than a similar weight of more dense material. In the process of tablet making different pressures are used for the compressing of various shapes of tablets. The flat-faced tablets show a relatively greater strength than the convex-shaped ones.

Ex. 2. Answer the questions.

1. What is pharmacy technology?
2. What does pharmacy technology involve?
3. What is the aim of pharmaceutical industry?
4. What does pharmaceutical industry include?
5. What is drug manufacturing?
6. What can the process of drug manufacturing be broken down into?
7. What is the future of pharmaceutical manufacturing?
8. How is the method of tablet making defined?
9. What is the difference between the use of sodium chloride and lactose?
10. How many lubricating and gliding substances are used and where?
11. What properties did starches possess?
12. Where are some materials continuously binding and sticking?
13. What is tablet?
14. Why does sticking take place?
15. How are more strongly compressed tablets being dissolved in the mouth?
16. What plays a very important role in tablet making?
17. What can you tell about the use of starch in tabletting?
18. What is the primary consideration in selecting particular shapes and sizes of tablets?
19. Why is it more convenient to have the thinnest edges of tablets?
20. Where are the size and shape of tablets specified officially?
21. When will the patient feel a pleasant lasting sense?
22. What is the common shape of a tablet?
23. Why is the density of compressing substance also important factor?
24. Where are different pressures required?
25. What do convex-shaped tablets show?
26. How is the tablet for making solutions required to dissolve?
27. What does a lighter and less dense material need?

Ex. 3. Read the text and be ready to discuss it in the pairs

Pharmacy technology for the manufacture of extemporal medicines

Medication Compounding

Pharmacy technology involves the compounding of medications such as medicated powders, tinctures, solutions, creams and ointments using not only compounding machines but manual tools such as a mortar and pestle. Today, the manufacture of medicines in pharmacies does not lose its significance. Extemporaneous production of medicines makes it possible for an individual approach to the patient taking into account the peculiarities of the organism, the course and symptoms of the disease, its stage. This is the main principle and advantage of "ex tempore" manufacture of medicines.

The art of preparing medications dates back to the origins of pharmacy. The role of the pharmacist has shifted from the classical "lick, stick, and pour" dispensary role (that is, "lick & stick the labels, count the pills & pour liquids"), to being an integrated member of the health care team directly involved in patient care. At pharmacies, they still practice the time proven art of compounding using modern variations of the “mortar and pestle” to prepare unique and individualized medications. Working with doctors, compounding allows pharmacists to customize the strength and dosage form of a medication according to individual needs. This may include making lozenges or preparing a drug that is no longer commercially available or it may involve changing a medication from a pill form into a penetrating skin cream, or adding flavors, or preparing a dye-free or preservative-free medication. The possibilities are endless.

Pharmacists can formulate and prepare just about any kind of medicine specifically designed just for you. Compounding services can enhance virtually any area of medicine including natural hormone replacement therapy, children’s dosage forms and flavors, capsule and suppository preparations, etc.

Dosage forms are a mixture of active drug components and non-drug components. The most common dosage forms are solid (pills, tablets, capsules, or suppositories), semisolid (creams, ointments) and liquid (syrups, spirits, elixirs, tinctures, solutions, sprays, aerosols, emulsions, extracts).

Ex. 4. Distribute these dosage forms into groups:
pills, creams, syrups, aerosols, tablets, extracts, capsules, suppositories, elixirs, spirits, ointments, tinctures, emulsions, solutions, sprays.

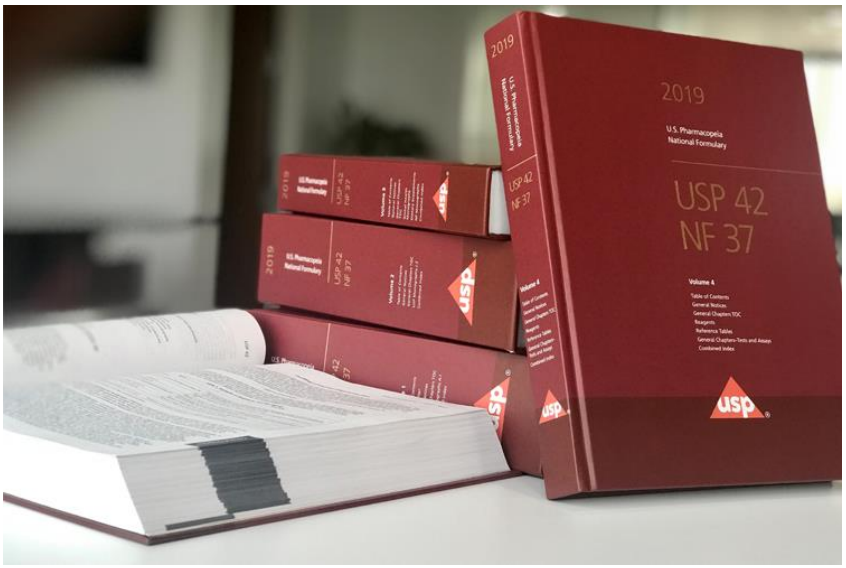
Liquid dosage forms are _____
Solid dosage forms include _____
Semisolid dosage forms are _____

Ex. 5. Read the text and be ready to discuss it in the pairs

Standards

While the **Food and Drug** Administration (FDA) has the legal responsibility for deciding whether a drug may be distributed and sold, there are definite standards for drugs set by an independent committee of physicians, pharmacologists, pharmacists and manufacturers.

This committee is called the **United States Pharmacopeia** (USP). Two important standards of the USP are that a drug must be clinically useful (useful for patients) and available in pure form (made by good manufacturing methods). If a drug has USP after its name, it has met with the standards of the Pharmacopeia. A list of drugs is published by the USP every 5 years but not all the drugs are listed in it. The **National Formulary** (NF) is a larger list of drugs which meets purity standards. The letters USP and NF after a drug indicate that the manufacturer claims his product conforms to USP or NF standards. It is up to the FDA to inspect and enforce the claims of drug manufacturers.



References

Libraries and hospitals have two large reference listings of drugs which give important information about drugs. The most complete and up-to-date is the **Hospital Formulary**, published by the American Society of Hospital Pharmacists. This listing

gives information about the characteristics of drugs and their clinical usage (application to patient care).

The **Physicians Desk Reference** (PDR) is published by a private firm. Manufacturers pay to have their products listed there. The PDR is a useful reference with several different indexes to identify drugs (generic and chemical names index, product identification index, manufacturers' index, drug classification index and full description about recommended dosages and administration for each drug).

Additional Reading

Text 1. Medicinal Plants

A medicinal plant is the term referring to any plants used for medicinal purposes. Medicinal plants have always been considered a healthy source of life for all people.

Many of the modern medicines are produced indirectly from medicinal plants, for example, aspirin. Plants are directly used as medicines by a majority of cultures around the world. There are a few drugs of ancient origin that are still used.

Opium preparations have a very long history, both for their pain-relieving and mind-altering properties. Quinine was introduced in Europe in the 17th century as very useful in afflictions of the heart. Garlic was prescribed for all lung and intestinal diseases.

Medicinal plants are still resources of new drugs. It is estimated there are more than 250, 000 flower plant species. Studying medicinal plants helps to understand plant toxicity and protect human and animals from natural poisons.

Therapeutic properties of medical plants are very useful in healing various diseases and the advantage of these medicinal plants is being 100% natural.

Plants can be prepared in a variety of forms depending on their purpose: juice, powder compressed into a pill, tincture, liniment, ointment, syrup, oil, hot infusion (like hot tea). Different parts of the plant may be used for medicinal purposes: the seeds, berries, leaves, barks, roots, fruits, or other parts of a plant.

Throughout history, the most common medicinal plants used have been the follows:

Parsley (Petroselinum crispum) is beneficial with health concerns regarding urination – kidney stones, urinary infections, and bladder stones to name a few.

Nettle (Urtica dioica) is one of the wonder plants with its expectorant, tonic, anti-inflammatory, diuretic properties and as an important source of beta-carotene, vitamin A, C and E, iron, calcium, phosphates and minerals. It is a powerful remedy against hepatic, arthritic or rheumatic conditions, allergies, anaemia and kidney diseases.

Aloe Vera is called "the elixir of youth" by the Russians, "the herb of immortality" by the old Egyptians. It is the medicinal herb most widely known for its noticeable impacts on health and at the same time the ingredient most widely used in the cosmetic industry.

Peppermint (Mentha piperita) leaf tea has been known for ages to cure an upset stomach. A complex oil has been suggested to calm the muscles in the digestive track.

Basil (Ocimum basilicum) is used to make tea, which calms the stomach, helping those with digestive issues. But a unique property that basil holds is its ability to clear acne. Simply rub the basil leaves on your face, and you'll be surprised how clear your face will get.

Lavender (Lavandula angustifolia) is popular because of its anti-fungal, anti-inflammatory, anti-depressant properties.

Text 2. Ricinus communis

Family: Euphorbiaceae.

Common Names: African Coffee Tree, Castor Bean, Castor Oil Plant, Higuereta, Higuerilla, Koli, La'Au-'Aila, Man's Motherwort, Mexico Weed, Pa'Aila, Palma Christi, Ricin, Ricino, Steadfast, Wonder Tree.

Description

The annual growth is up to 15 feet or higher in the tropics. The large, lobed leaves are up to 3 feet across. It is also grown as a summer ornamental in temperate areas, where, depending on the cultivar, the leaves can be green to redpurple. Spiny fruits form in clusters along spikes. The fruits contain plump seeds resembling fat ticks in shape, usually mottled black or brown on white. The highly toxic seeds have a pleasant taste.

Toxic Part

The toxin is contained within the hard, water-impermeable coat of the seeds. The toxin is not released unless the seed coats are broken (e.g. chewed) and the contents digested.

Toxin: Ricin.

Clinical Findings

Ingested seeds that remain intact as they pass through the gastrointestinal tract generally do not release toxin or cause toxicity. However, if the seeds are chewed, pulverized or digested (i.e. if passage through the gastrointestinal tract is delayed), then the toxin is absorbed by intestinal cells causing mild to severe gastrointestinal toxicity.

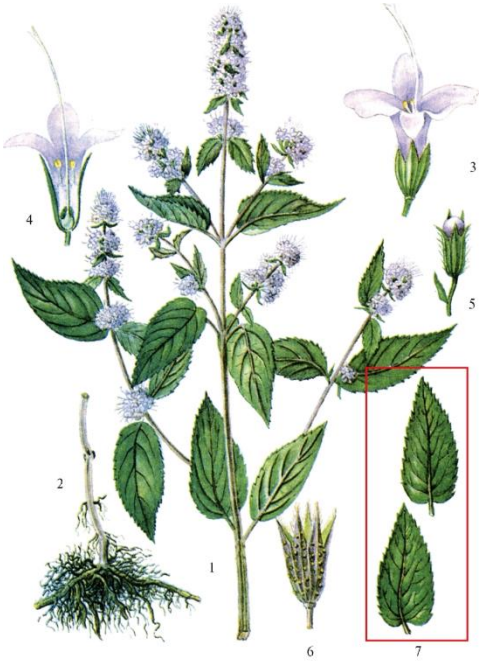
Effects depend upon the amount of toxin exposure and include nausea, vomiting, abdominal cramping, diarrhea and dehydration. Variations in the severity of toxicity may be related to the degree to which the seeds are ground or chewed before ingestion. Parenteral administration (such as by injection or inhalation) or perhaps a large ingestion may produce life-threatening systemic findings, including multisystem organ failure, even with small exposures.

Management

Ingestion of intact seeds does not cause toxicity in the majority of cases and requires no therapy. Cases associated with gastrointestinal effects need to be assessed

for signs of dehydration and electrolyte abnormalities. Activated charcoal should be administered. Intravenous hydration, antiemetics and electrolyte replacement may be necessary in severe cases, particularly in children. Consultation with a Poison Control Centre should be strongly considered.

Text 3. Chinese Formulations



Bo he (Herba Menthae piperitae, Peppermint)

Bo he is the dried above ground part of Mentha, pertaining to Labiatae. It is collected in a fine day during summer and fall when the plant is prosperous or when flowers blossom for the third round. It is sun dried or dried in the shade, and then cut into segments. The raw form is used.

Medicinal Efficacies Disperse wind-heat; clear head and eyes; soothe throat, promote eruption; soothe liver and regulate qi.

Clinical Applications

1. External contraction of wind-heat, early stage of warm disease Bohe treats external contraction of wind-heat, or pathogenic qi in defense level in the early stage of warm disease, manifesting as fever, little aversion to wind-cold, and headache, in combination with Jinyinhua, Lianqiao and Niubangzi; for example in Yinqiao Powder.

2. Headache, dizziness, red eyes and tearing It treats headache and dizziness due to wind-heat up attacking, in combination with Chuanxiong, Shigao and Baizhi. It is indicated for red eyes with tearing due to wind-heat up attacking, in combination with Sangye, Juhua and Manjingzi.

3. Sore throat It is indicated for sore throat due to prosperity of wind-heat, in combination with Jiegeng, raw Gancao and Jiangcan, such as in Liuwei Decoction.

4. Rubella, itching and measles failing to erupt It treats itching due to rubella in combi-nation with Jingjie, Fangfeng and Jiangcan. For measles failing to erupt due to «wind-heat fettering superficies, it is in combination with Chantui, Niubangzi, Guailiu; for example in Zhuye Liubang Decoction.

5. Stagnation of liver qi, oppression in chest and hypochondriac pain In case of stagnation of liver qi, which manifests as oppression in chest, hypochondriac pain, menstrual irregularities, it is used with Chaihu, Baishao and Danggui; for example in Xiaoyao Powder.

Usage and Dosage 3~6g. It is decocted later in decoction. Leaf of Bohe is good at inducing sweating to release superficies, and stem of Bohe is good at promoting qi flow and soothing the middle.

Precautions For it is fragrant and pungent to dispel, avoid with excessive sweating due to weak body.

Júhuā (Flos Chrysanthemi, Chrysanthemum Flower)

Juhua is the dried capitulum of Chrysanthemum morifolium Ramat., pertaining to Asteraceae. Collect from September to November when it is in full blossom. It is dried in the shade, baked, fumed, or sun dried after steaming. The raw form is used. It can be classified into “Haoju”, “Chuju”, “Gongju” and “Hangju” according to the producing area and processing method. Haoju and Chuju are the best in quality. According to the differences in color, it can be classified into yellow Juhua and white Juhua.

Medicinal Properties Sweet, bitter and slightly cold; relate to lung and liver meridians.

Medicinal Efficacies Dispel wind-heat, pacify liver, subdue yang, clear liver, im-prove vision, clear heat, and relieve toxicity.

Clinical Applications

1. External contraction of wind-heat, and early stage of warm disease Juhua treats cold due to wind-heat, or early stage of warm disease, both manifesting as fever, headache and cough, in combination with Sangye, Lianqiao and Bohe; for example in Sangju Decoction.
2. Hyperactivity of liver yang It is indicated for headache and dizziness due to hyperactivity of liver yang, in combination with Shijueming, Zhenzhumu, and Baishao. For dizziness and headache due to up-flaming of liver fire, prosperous heat in liver meridian, and generation of wind by extreme heat, it is in combination with Lingyangjiao, Gouteng, and Sangye, such as in Lingjiao Gouteng Decoction.
3. Reddish eyes and blurred vision It treats reddish and swollen eyes with pain due to wind-heat in liver meridians, in combination with Chantui, Muzei and Baijiangcan. For blurred vision due to malnutrition of eyes, caused by essence and blood deficiency in liver and kidneys, it is in combination with Gouqizi, Shudihuang, Shanzhuyu; for example in Qiju Di-huang Pills.
4. Abscess, swelling, sores and toxin In case of abscess, swelling, sores and toxin, it is used with Jinyinhua and Shenggancao.

Usage and Dosage 5~9g. For external contraction of wind-heat, the yellow Juhua is used. To clear heat, improve vision and pacify liver, the white Juhua is used.

Similarities: Both Sangye and Juhua can dispel wind-heat, pacify liver to subdue yang, clear liver, improve vision. As a result, both are often used in mutual reinforcement to treat external contraction of wind-heat, or up-flaming of liver fire, manifesting as reddish and swollen eyes with pain, as well as dizziness due to hyperactivity of liver yang.

Differences: Sangye is weak to disperse wind-heat, but good at clearing lung and moistening dryness, and also can cool blood to stop bleeding, so as to treat dry cough

due to lung heat as well as hematemesis and epistaxis. Juhua is good at pacifying liver and improving vision, and also can clear heat and relieve toxicity, to treat hyperactivity of liver yang or abscess, swelling, sores and toxin.

Shengma (Cimicifugae Largetrifoliolious Bugbane Rhizome)

Shengma is the dried rhizome of Cimicifuga heracleifolia Kom., Cimicifuga dahurica, or Cimicifuga foetida L., pertaining to Ranunculaceae. It is collect-ed in spring. After the fibrous root is removed, it is sun dried, and then cut into slices. The raw form is used or after processed with honey.

Medicinal Properties Pungent, slightly sweet and slightly cold; relate to lung, spleen, stomach, and large intestine meridians.

Medicinal Efficacies Relieve exterior, promote eruption; clear heat, relieve toxicity; raise yang qi.

Clinical Applications

1. External contraction of exterior syndrome Shengma treats cold due to wind-heat, or early stage of warm disease, both manifesting as fever and headache, in combi-nation with Sangye, Juhua and Bohe. Also it treats common cold due to wind-cold with aversion to cold, fever, no sweat, headache and cough, in combination with Mahuang, Zisu and Baizhi.

2. Measles failing to erupt It treats in the early stage measles failing to erupt, in combination with Gegen, Baishao and Gancao; for example in Shengma Gegen Decoction.

3. Swollen and sore throat, toothache, stomatitis, pestilential toxin and macula It is indicated for various diseases caused by heat toxin. It can treat swollen gum with pain, stomatitis, in combination with Shengshigao and Huanglian, such as in Qingwei Powder. For swollen-head infections due to wind-heat and epidemic toxin up attacking, manifesting as reddish and swollen head and face, swollen and sore throat, it is in com-bination with Huangqin, Huanglian and Xuanshen; for example in Puji Xiaodu Decoction.

4. Qi deficiency with sinking, visceral prolapse, metrorrhagia and metrostaxis, hematochezia It treats chronic diarrhea, and prolapse of rectum, uterus and kidneys, due to qi deficiency with sinking, in combination with Huangqi, Renshen and Chaihu, such as in Buzhong Yiqi Decoction.

Usage and Dosage 3~9g. To raise yang qi and lift sinking, it is stir-baked with liquid.

Precautions For it tends to lift and float, avoid with yin deficiency and yang floating, cough, fullness in chest, reversed flow of qi, and measles erupted.

Text 4. Starch (Amylum)

Biological Source

Starch consists of polysaccharide granules obtained from the grains of maize (*Zea mays* Linn.); rice (*Oryza sativa* Linn.); or wheat (*Triticum aestivum* Linn.); belonging to family Gramineae or from the tubers of potato (*Solanum tuberosum* Linn.), family Solanaceae.

Geographical Source

Most of tropical, as well as, sub-tropical countries prepare starch commercially.

Preparation of Starch

Depending upon the raw material to be used for processing or type of the starch to be produced, different processes are used for the commercial manufacture of starch.

Potato Starch: The potatoes are washed to remove the earthy matter. They are crushed or cut and converted into slurry. Slurry is filtered to remove the cellular matter. As potatoes do not contain gluten, they are very easy to process further. After filtration, the milky slurry containing starch is purified by centrifugation and washing. Then, it is dried and sent to the market.

Rice Starch: The broken pieces of rice resulted during the polishing are used for processing. The pieces of rice are soaked in water with dilute sodium hydroxide solution (0.5%), which causes softening and dissolution of the gluten. After this, the soaked rice pieces are crushed and starch prepared as described under potato starch.

Maize Starch (corn starch): Maize grains are washed thoroughly with water to remove the adhered organic matter after which they are softened by keeping in warm water for 2–3 days. Sufficient sulphur dioxide is passed to the medium to prevent fermentation. The swollen kernels are passed through attrition mill to break the grains, so as to separate the endosperm and outermost coating of the grains. At this point, special attention is given to separate

Identification Tests

1. Boil 1 g of starch with 15 ml of water and cool. The translucent viscous jelly is produced.

2. The above jelly turns deep blue by the addition of solution of iodine. The blue colour disappears on warming and reappears on cooling.

Uses

Starch is used as a nutritive, demulcent, protective and as an absorbent. Starch is used in the preparation of dusting talcum powder for application over the skin. It is used as antidote in iodine poisoning, as a disintegrating agent in pills and tablets, and as diluent in dry extracts of crude drug. It is a diagnostic aid in the identification of crude drugs. Glycerin of starch is used as an emollient and as a base for suppositories. Starch is also a starting material for the commercial manufacture of liquid glucose, dextrose and dextrin. Starch is industrially used for the sizing of paper and cloth.

Text 5. Vitamins

Vitamins are vital substances (from the Latin vita = life) required by organism as a nutrient in very small amounts. Your body needs them to grow and develop normally. Until the 1900s, vitamins were obtained solely through food intake. The sources of vitamins are leafy green and yellow vegetables, fruits, liver, and other glandular organs, beans, nuts, cereals, eggs, milk, fish, and poultry. Many food sources contain different ratios of vitamins. That is why, if the only source of vitamins is food, changes in diet will alter the types and amounts of vitamins ingested. Nowadays there are also manmade vitamins which are synthesized in the laboratory. Hence, these are called synthetic vitamins. These synthetic vitamins are mostly used for therapeutic purposes. An individual who eats a well-balanced meal does not need synthetic vitamins because he is assured of the normal intake of vitamins from food sources.

Vitamins are classified as water-soluble and fat-soluble. In humans there are 13 vitamins: four fat-soluble vitamins (A, D, E and K), and nine water-soluble vitamins (eight B vitamins and vitamin C). Water-soluble vitamins dissolve easily in water and are readily excreted from the body with urine, that is why their consistent daily intake is important. Fat-soluble vitamins are absorbed through the intestinal tract with the help of lipids and more likely to accumulate in the body.

Multiple vitamins are essential for normal metabolism, development and growth of the organism and cellular regulation. But each vitamin has its specific job.

Vitamin A (retinol) is important for normal vision especially for normal night vision, normal bone and skeletal growth and in establishing the cells of both the nervous and reproductive systems.

Vitamin D (calciferol) promotes bone and teeth development because it facilitates absorption of calcium and phosphorus.

Vitamin E (or tocopherol) is important for cellular respiration and the prevention of anaemia of the red blood cells.

Vitamin K is needed in the proper coagulation of blood.

Vitamin C (or ascorbic acid) is needed in holding cells together. It maintains the integrity of the cells. It builds body resistance to infection. It improves iron absorption and helps in the healing of wounds and bone fractures. It aids in metabolism.

Vitamin B, (or thiamine) helps maintain good appetite, good muscle tone, and normal function of the nerves.

Vitamin B2 (or riboflavin) is essential for protein, fat, and carbohydrate metabolism. It maintains the health of the skin, tongue, mouth, and normal vision. It is needed for proper growth and development.

Vitamin B3 better known as niacin is important in energy metabolism. It also aids in photosynthesis in plants.

Vitamin B6 (pyridoxine) is important in amino acid metabolism. It catalyzes urea production, the synthesis of essential fatty acids.

If you have low levels of certain vitamins, you may develop a deficiency disease (avitaminosis). For example, if a baby doesn't get enough vitamin D, it could develop rickets.

The best way to get enough vitamins is to eat a balanced diet with a variety of foods. In some cases, you may need to take a daily multivitamin for optimal health. However, high doses of some vitamins can cause allergic reactions and make you sick (hypervitaminosis). This is especially true with fat-soluble vitamins.

Vitamin C

Vitamin C is a water-soluble vitamin used to treat and prevent a wide variety of conditions. Often, people use it to prevent or treat the common cold. However, there are other uses of vitamin C as well, such as for reducing the risk of heart disease.

The vitamin has several different effects in the human body, such as:

Antioxidant - As an antioxidant, it helps prevent the formation of free radicals, damaging molecules or atoms. Free radicals play a role in various age-related conditions, such as cancer and heart disease.

Immune function - There are numerous different mechanisms by which vitamin C may improve immune function. At this time, it is not entirely clear how the vitamin stimulates the immune system.

Iron absorption - Vitamin C aids in the absorption of iron from the digestive tract into the body.

Various metabolic and synthesis processes - It is important for many different crucial processes in the body, including forming cartilage and proteins, building numerous compounds or tissues in the body.

Vitamin C may be effective for several different uses. However, there is much controversy about some uses, such as for the common cold.

Most people do not experience side effects with vitamin C (at normal doses). However, some people may experience side effects (especially with high doses), including nausea, vomiting, heartburn or indigestion, insomnia, kidney stones. Normal doses are probably safe for most people, but high doses can cause problems.

Text 6. **Nutrition**

Food provides the energy and nutrients you need to be healthy. Nutrients include proteins, carbohydrates, fats, vitamins, minerals and water.

Protein is in every living cell in the body. Our bodies need protein from the foods we eat to build and maintain bones, muscles and skin. We get proteins in our diet from meat, dairy products, nuts and certain grains and beans. It is important to get enough dietary protein. You need to eat protein every day, because your body doesn't store it the way it stores fats or carbohydrates. The average person needs 50 to 65 grams of protein each day.

Carbohydrates are one of the main types of nutrients. They are the most important source of energy for your body. Your digestive system changes carbohydrates into glucose (blood sugar). Your body uses this sugar for energy for your cells, tissues and organs. It stores any extra sugar in your liver and muscles for when it is needed.

Carbohydrates are called simple or complex, depending on their chemical structure. Simple carbohydrates include sugars found naturally in foods such as fruits, vegetables, milk, and milk products. Complex carbohydrates include whole grain breads and cereals, starchy vegetables and legumes.

Fat is a major source of energy and aids your body in absorbing vitamins. It's important for

proper growth, development and keeping you healthy. Fats are an especially important source of calories and nutrients for infants and toddlers. Dietary fat also plays a major role in your cholesterol levels.

But not all fats are the same. You should try to avoid

– Saturated fats such as butter, solid shortening, lard and fatback

– Trans fats, found in vegetable shortenings, some margarines, crackers, cookies, snack foods

Vitamins should be supplied daily in the diet.

Minerals are important for your body to stay healthy. Your body uses minerals for many different jobs, including building bones, making hormones and regulating your heartbeat.

There are two kinds of minerals: macrominerals and trace minerals. The former are needed in larger amounts and include calcium, phosphorus, magnesium, sodium, potassium, chlorine and sulphur. The latter are needed just in small amounts and include iron, manganese, copper, iodine, zinc, cobalt, fluorine and selenium.

Every living creature needs clean and safe drinking water. How much do you need? It depends on your size, activity level and the weather - all make a difference.

The food which contains all above nutrients and provides the optimal growth and development is known as a balanced diet, whereas an unbalanced diet causes various health problems, such as obesity, anorexia, bulimia.

In today's fast-moving world people have less and less time to spend eating, let alone cooking. It is probably for this reason that junk food has become so popular. Junk food includes anything that is high in calories but lacking in nutrition. Hamburgers, crisps, chocolate bars and hot dogs fall into this category. Pizzas are also included as they contain a lot of fats. The researchers suggest that the new generation will be much more likely to suffer from heart and liver diseases because of unhealthy food. Learning to eat nutritiously is not hard. The key is to:

– Eat a variety of foods, including vegetables, fruits and whole-grain products
– Eat lean meats, poultry, fish, beans and low-fat dairy products
– Drink lots of water
– Go easy on the salt, sugar, alcohol, saturated fat and trans fat.

Text 7. Chemistry

Chemistry is often said to be the central science, as it connects all other sciences. While mathematicians calculate the world, physicists explain it and biologists say what lives in it, chemistry looks at everything in the world and explains how it is made and what it can do.

Chemistry began with fire. Burning changes things and ancient man must have wondered what happened to the wood he burnt. It was by burning things that ancient man discovered iron and glass, combining different substances in the fire and seeing how they combined. Once gold was found, the false science of alchemy was born. People believed they could change ordinary metals like iron into gold. Though the idea was wrong, the alchemists discovered many of the chemical processes that are in use today.

The origin of modern chemistry comes from the work of Antoine Lavoisier, an 18th century Frenchman who was executed in 1794 during the French Revolution. He formulated the idea of the conservation of mass: that is, even though substances can be changed, their quantity of mass remains the same always. Although Lavoisier was the first to publish his ideas, in Russia, Mikhail Vasilyevich Lomonosov had reached the same conclusions some years earlier. Both men were interested in the nature of

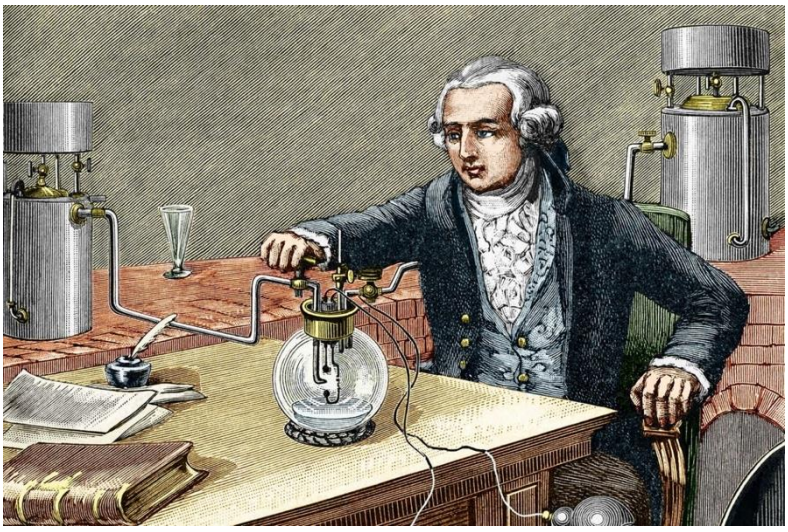
combustion - what happens when things burn and this was the first breakthrough in our understanding of chemistry.

The second great development in chemistry came later and concerned the nature of matter itself: how it was made up and what its parts were. In the early part of the 19th century, the British scientist, John Dalton stated that all matter was made up of atoms of different elements and that these could not be broken down into smaller parts. We know now that atoms exist and that they do have parts which can be broken down, but at the time his ideas divided chemists into those who accepted his ideas and those who did not. There was a whole century of research to be done before the work of Marie Curie on radioactivity and of Ernest Rutherford and Niels Bohr on atomic structure finally proved that Dalton was correct after all.

Even while chemists were divided on atomism, it became necessary for someone to make sense of the growing list of elements that were being discovered. That someone was Dmitri Mendeleev. He took Dalton's theory of atomism and arranged the elements by their atomic weight and by their chemical properties. So accurate was his classification of the elements, that he was able to predict the properties of undiscovered ones to fill the gaps in the table. Mendeleev's table is one of the most useful and important generalisations of chemistry and of all science. These three developments give us the definition of chemistry. It is the science of the composition, structure and properties of substances and how they can be transformed.

Text 8.Antoine Lavoisier

Lavoisier discovered oxygen and its role in combustion and respiration (breathing); he disproved the phlogiston theory which was popular at the time; he drew



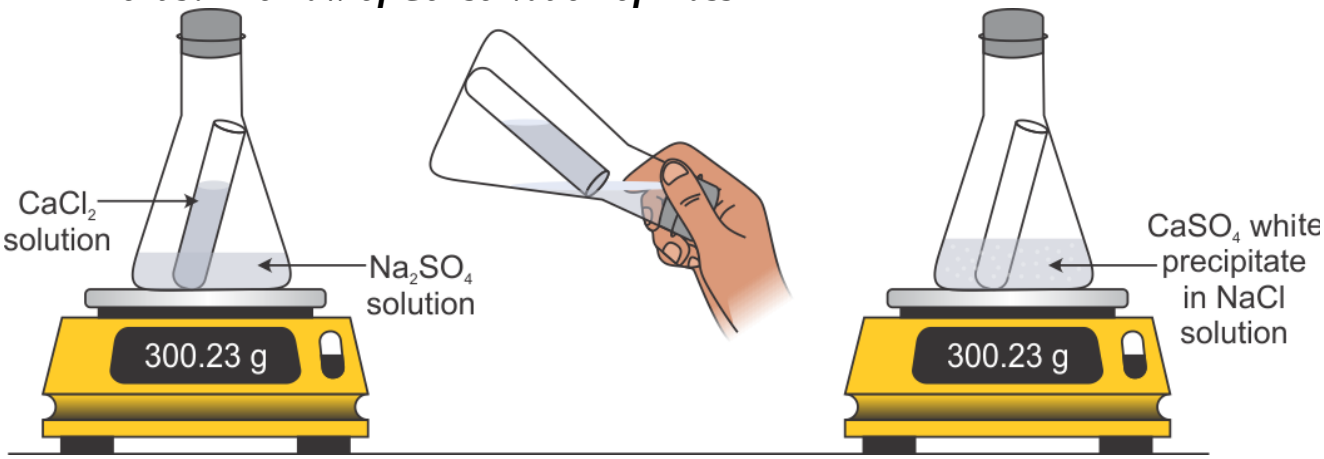
up a list of 33 elements or substances that could not be broken down further and formed the basis of the modern- day list of elements. Added to that, he proposed the Law of Conservation of Mass. His father was a lawyer, and in line with his family's wishes, Lavoisier completed a law degree, but his main interest was in science. In 1764, at the age of 21, he published his first paper on chemistry, and in 1768 when he was just 25 years old he was made a member of the French Academy of Sciences, one of the most important scientific institutions in the world. Lavoisier, too, was fascinated by combustion and disagreed with the phlogiston theory, which he s out to disprove. He did this by carefully weighing the reacting materials and the products chat were made in a chemical reaction. This was a very important step in the development of chemistry, and is now known as quantitative chemistry, that is, chemistry that involves accurate measuring.

In order to accurately measure changes in mass that happened during his experiments, Lavoisier developed a balance that could weigh to 0.0005g. Measurement was important because Lavoisier strongly believed that matter was conserved through any reaction and this belief led to the development of the Law of Conservation of Mass.

Through this, he discovered that it did not support the phlogiston theory because after burning, the mass of the material was greater than it had been at the start. If the elements had really contained phlogiston and lost it during the reaction, they should have weighed less, not more. Further experiments were required to find out what was happening in these reactions, and Lavoisier discovered that air was absorbed as these elements burnt. He realized that something (later identified as oxygen) was taken in during combustion rather than being given out (the phlogiston theory).

One of these was that respiration was caused by chemical reactions with oxygen in the air. By carefully composing and decomposing water, he discovered that it is made up of oxygen and hydrogen. He gave names to elements which reflected their functions. For example, he up with the name oxygen because it means acid-former, and that is what oxygen does. This system of chemical nomenclature is still largely in use today.

Text 9. The Law of Conservation of Mass



The Law of Conservation of Mass is one of the most important concepts in chemistry. The law states that matter can neither be created nor destroyed. This means that in any chemical reaction, the mass of the reacting substances at the start of the reaction will be the same as the mass of the products at the end of the reaction. Matter can change its form in a reaction, for example from a liquid state to a gas, but the mass will remain the same.

The Law of Conservation of Mass is also known as the Lomonosov-Lavoisier Law because, as we saw in unit 6, both of these scientists contributed to its development. Lomonosov first described the law in a letter to a friend and then published his ideas in a dissertation dated 1760. Lavoisier reached the same conclusions much later, in 1789, and was the first to formulate the law in clear scientific terms. For this reason, the law takes its name from both these brilliant men.

The idea of conservation of mass, however, can be traced back as far as ancient Greece. In the 5th century BC, Anaxagoras, a philosopher and scientist, said that nothing comes into existence or is destroyed and that everything is a mixture of pre-

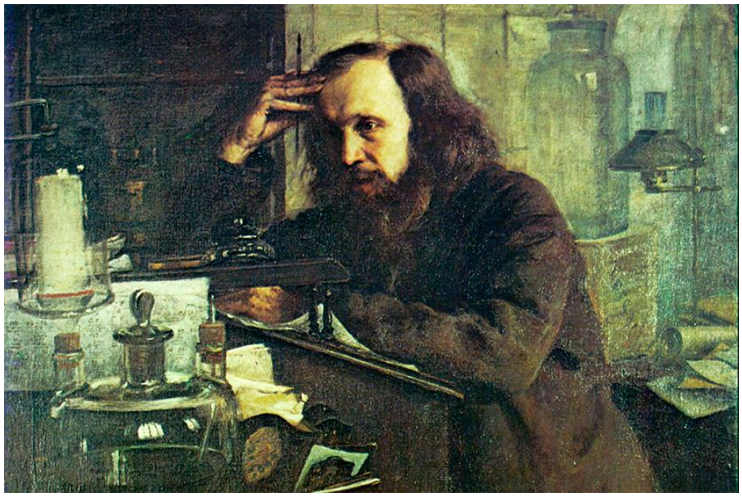
existing things. Over the course of history, many other distinguished scientists also expressed their views on the conservation of mass.

The dominant theory in the 18th century was the phlogiston theory. According to this theory. all flammable materials (that is, materials that can burn) contain a substance called phlogiston. which is released during the burning process. That means that when flammable materials burn, the new substance, without phlogiston, should weigh less than the original substance. But this theory was wrong. Experiments showed that some metals actually increased in weight when they burnt. Lomonosov's experiment in 1756 demonstrated that the increase in weight was due to air. Many years later, Lavoisier proved that oxygen was required for combustion (burning); without it, the mass of burnt matter remained the same.

The Law of Conservation of Mass was not discovered in the usual scientific way. Lavoisier did not reach his conclusions by generalizing from a large number of similar cases because, at that time, there was not enough scientific information for him to do so. Instead, Lavoisier assumed that his theory was true and then he set about proving it. His belief was justified because he did indeed prove the Law of Conservation of Mass.

The fact that the total amount of matter in chemical reactions is always conserved and never disappears even though the matter may be in an altered form, is not only important for science, but also for other fields of human knowledge, particularly philosophy. It has led us to think about the nature of existence, and where we truly come from.

Text 10. Dmitri Mendeleev



Dmitri Ivanovich Mendeleev was born in Tobolsk, in Siberia, on 7th February, 1834. As a child he showed a great interest in Mathematics and Physics and was a talented student. Despite the hardships experienced by his family while he was growing up, his mother was determined to see him educated and to help him achieve his dreams. After the family moved to St Petersburg, she managed to enroll him as a student science teacher on a full scholarship. Despite many more problems, Mendeleev earned his degrees and eventually, in 1863, was appointed Professor of Chemistry at the Technological Institute and the University of St Petersburg.

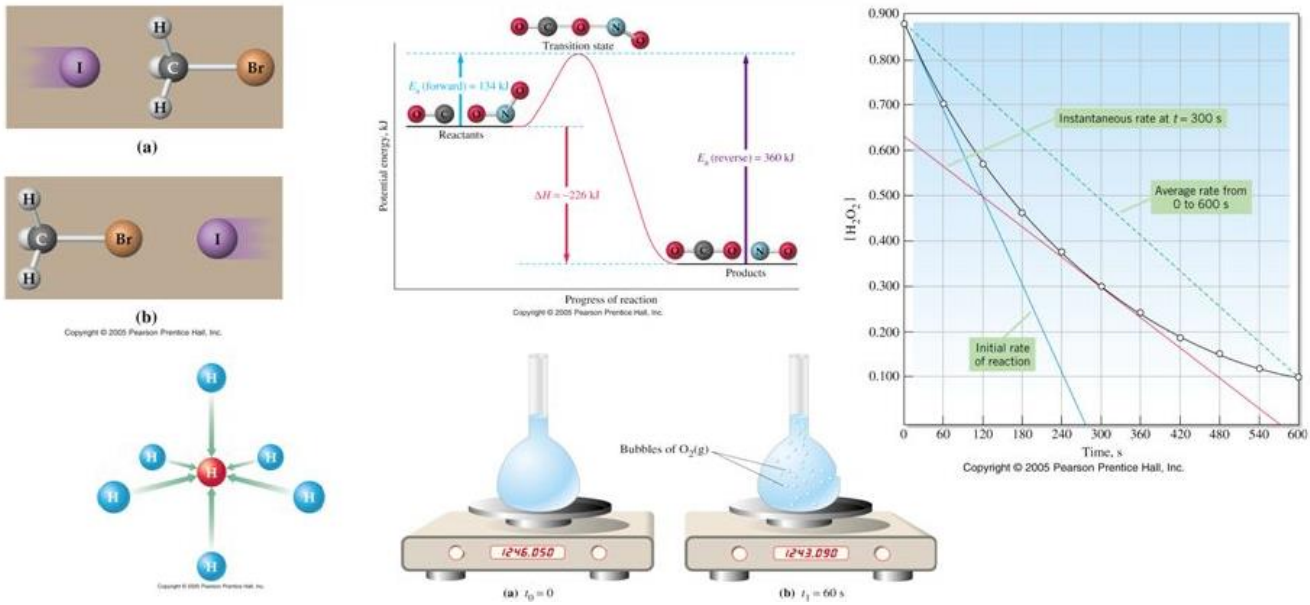
Probably his greatest scientific achievement was the discovery of the periodic law and the development of the periodic table of elements. He left gaps in his table for undiscovered elements and predicted the properties of the elements that would fit these gaps. His predictions were confirmed when, during his lifetime, three predicted elements; gallium, germanium and scandium, which he had named eka-aluminium, eka-

silicon and eka-boron respectively, were discovered. These discoveries gave him great respect among members of the scientific community.

However, Mendeleev made other important contributions to science. He was involved in many areas including hydrodynamics, agricultural chemistry, mineral recovery, meteorology and chemical technology. One particular contribution involved solutions. He spent a lot of time studying how the nature of solutions could be determined, adding greatly to our understanding in that field. In addition, he was involved in physical chemistry, looking at the expansion of liquids because of heat. He spent time in Paris with Henri Victor Regnault studying the densities of gases and came up with a formula to explain how gases are uniform when expanding; in other studies, he defined the absolute boiling point of a substance. His studies of gases at high and low pressures moreover, allowed him to develop an accurate barometer and while working for the Russian navy, he came up with pyrocollodion, a smokeless powder based on nitrocellulose. The list of his achievements is endless!

Despite his international reputation as one of the world's most important scientists, the Tsar at the time did not approve of Mendeleev's polities, resulting in his resignation from the University of St Petersburg in 1900. He died on 20th January, 1907, from pneumonia.

Text 11. Chemical kinetics



Chemical kinetics is the study of rates of chemical reactions. In the world around us billions of chemical reactions occur; some are incredibly slow while others are amazingly fast. It can take years for wood to rot, while the lighting of a match takes just an instant. Chemical kinetics attempts to understand the factors that control the rates of chemical reactions. These factors are concentration, pressure, surface area, the nature of the reacting substances, temperature and catalysts.

In general, increasing the concentration of the reacting substances increases the reaction rate. This is because molecules must collide in order to react. The more concentrated the reacting substances, the more molecules there will be in any given volume, and therefore, the greater the number of molecular collisions.

If the substances involved in the reaction are gases, pressure will have an effect on reaction rate. Solids and liquids cannot be compressed, but gases can, so pressure acts as a kind of concentration for gases. The volume of a gas decreases as the pressure increases. For a given amount of gas, increasing the pressure means we are foreign the same number of gas molecules to occupy a smaller volume. In the smaller volume, the molecules will collide more often, which means there will be a greater number of successful collisions in a given period of time. Reaction rate increases with pressure.

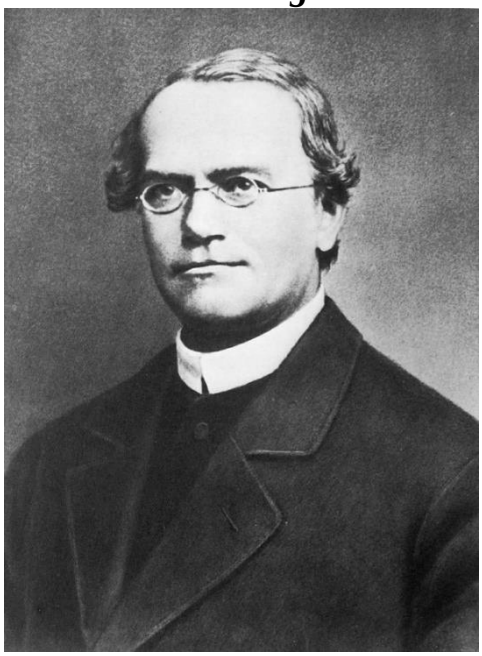
If a chemical reaction takes place at a boundary between two states (gas, liquid or solid), the surface area will affect the reaction rate. Only the molecules at the surface area are available to react, so the surface area increases the number of molecules that are able to react, and this leads to a higher reaction rate.

Some substances are naturally more reactive than others. For example, if the metals magnesium, zine and copper are dropped into acid in separate test tubes, three very different results are obtained. The magnesium is consumed within seconds, the zinc is consumed but takes much longer, and the copper shows no reaction. Therefore, magnesium is more reactive than zinc and copper.

Temperature affects the rate of a chemical reaction in two ways. Firstly, molecules move faster in a hot system than in a cold one, so they will collide more often if they are moving faster. Secondly, increasing the temperature increases reaction rate through its effect on the collision (known as activation energy) of the molecules. Molecules must collide with sufficient for in order to combine and produce a chemical reaction. Higher temperatures give molecules the energy to collide they collide with less than a certain amount of energy, they simply bounce off of cash other unchanged.

Finally, a catalyst is a substance that increases the rate of a chemical reaction without being consumed in the reaction. It increases the reaction rate by reducing the activation energy, that is, the minimum amount of energy that the reaction molecules must have in order to react.

Text 12. Gregor Mendel



Gregor Mendel was born on 20th July, 1822, and died on 6th January, 1884. He was a biologist and botanist whose scientific research showed that inheritance proceeds according to certain scientific laws.

Mendel was a brilliant student and his family encouraged him to study, but they were very poor so Mendel entered a monastery in 1843. There he taught Mathematics, Physics and Greek to high school students. Eight years later, in 1851, the monastery sent him to the University of Vienna where he was able to continue his education. In 1853, he returned to the monastery and began teaching and researching again.

Mendel's theories of heredity based on his work with pea plants are well known to students of Biology.

But his findings were so different from the accepted views on heredity at the time that his work was ignored until long after his death. His paper, Experiments in Plant Hybridization, in which he described how traits were inherited, has become one of the most influential publications in the history of science.

Mendel was the first person to trace the characteristics of successive generations of an organism. In Mendel's day, a number of hypotheses had been suggested to explain heredity. The most popular one was the so-called blending theory. According to this theory, inherited traits blended from generation to generation. For instance, a red rose crossed with a white rose would, over time, produce a pink rose. Another theory put forward by Charles Darwin was called pangenesis. This stated that there were hereditary particles in our bodies, and that these particles were affected by our actions. The altered particles could be inherited by the next generation. These theories were disproved by Mendel.

The first thing he noticed when he began his experiments was that traits were inherited in certain numerical ratios. This observation led him to come up with the idea of the dominance of genes and he tested it in peas. For seven years he crossed thousands of plants to prove the Laws of Inheritance. From his experiments, Mendel developed the basic laws of heredity. Those laws are the following: that traits do not combine, but are passed whole from generation to generation (which disproved the blending theory and Darwin's theory); each member of the parental generation passes on only half of its hereditary information to each offspring (with certain traits dominant over others); and different offspring of the same parents receive different sets of hereditary information.

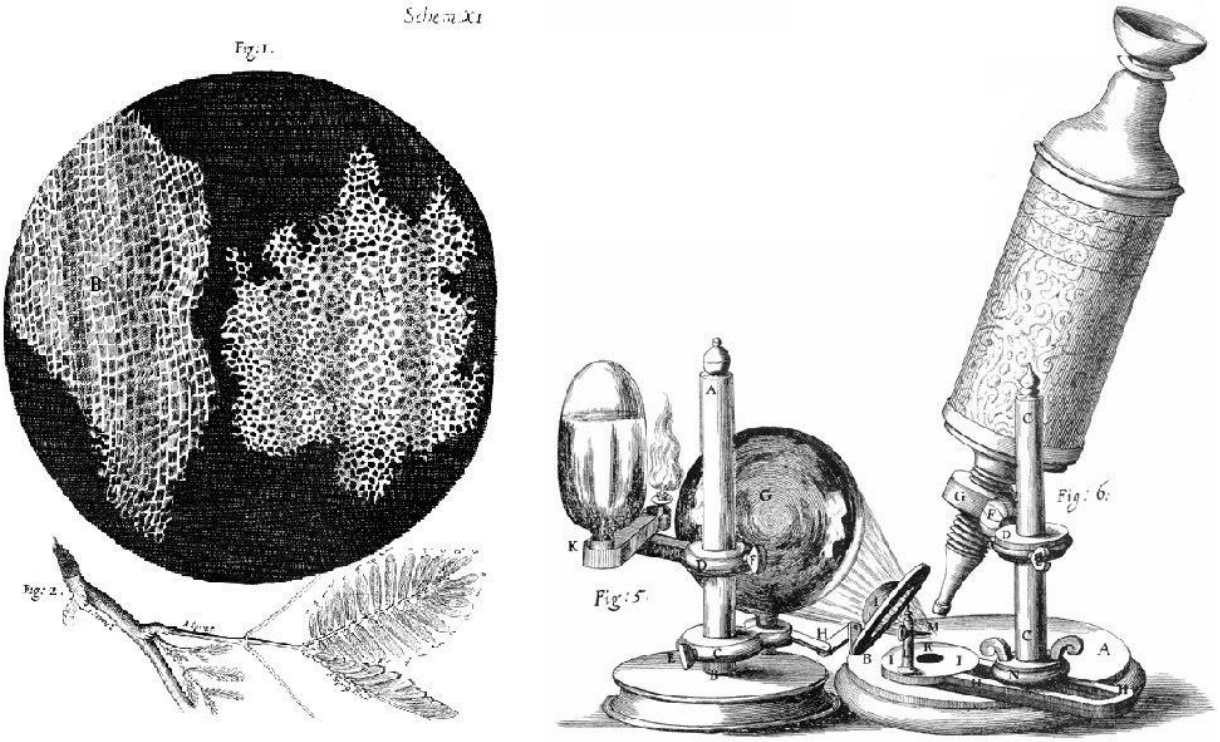
Mendel's research formed the beginnings of the modern science of genetics. Genetic theory has had a huge impact on our lives. Many diseases, for example haemophilia, are known to be inherited, and family histories can be traced to determine the probability of passing on a hereditary disease. Scientists can now design plants that are easier to grow, or which can produce more food. This practical side of the results of Mendel's research is being used to improve the way we live.

Text 13.Cells

A cell is a tiny unit which constitutes the core of all living things: human, animal, plant or microbe. It was an English mathematician and physicist called Robert Hooke who, in 1665, first recorded his observations of cells under a microscope and published them in a book entitled Micrographia. Hooke noted that there are single-celled organisms, such as the amoeba, and multi-celled organisms, such as man. In the latter type of organism, it was revealed that the cells are grouped together to form different types of tissues, and the tissues then form organs.

The structure of a cell appears very simple. It is a jelly-like mass, called protoplasm, enclosed by a wall, with a central nucleus. Although research continued into the structure and function of cells, it was not until the late 19th century that a process of staining and fixing tissues was developed. This made it possible for scientists to preserve the cells for more detailed observation under a microscope. It was then discovered that new cells are formed by the division of old ones, and that each cell has its own lifespan. In other words, a cell is born (created), feeds, produces waste, grows,

splits to create new cells or disintegrates and dies. Each cell has a specific function and specific characteristics, for example, muscle cells stretch and nerve cells carry



information.

Stem cells are central to this infrastructure. These cells provide a remarkable repair system for the body, as they are able to develop into any type of cell. They can continue to redivide as often as possible to replace damaged or dying cells. The cells created from the division of a stem cell can remain stem cells, or become any of the other specific cells (blood cells, brain cells or other) in the organism. The key to the division process lies in the nucleus. The nucleus splits into two identical parts in the shape of rods or threads, which break away in opposite directions and form new nuclei. At this point the cell itself divides and two new cells are born.

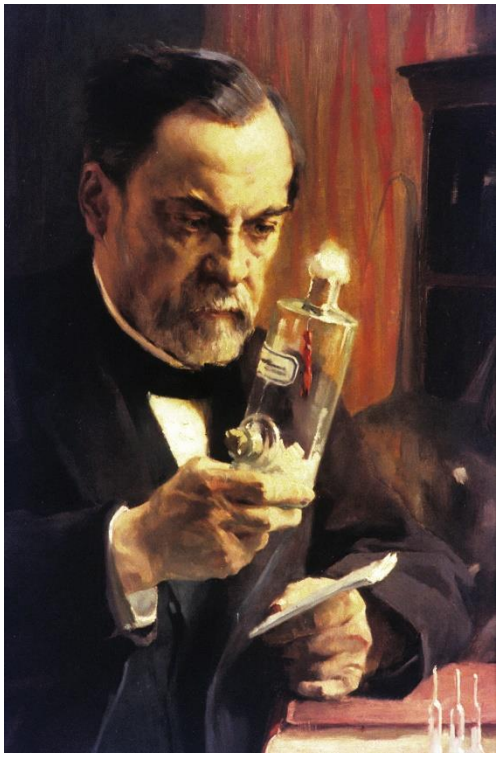
The rods or threads are called chromosomes. Each chromosome is made up of links of protoplasm called genes joined together in a chain. It is the genes that determine the essence of each cell and its particular characteristics. The number of chromosomes found in a particular organism always remains the same, but it will vary depending on the species; human beings have 48, for example, and sugar cane over 200.

Text 14. Louis Pasteur

Pasteur (1822-1895) began his scientific career as a chemist, but it is because of his applications of germ theory to the prevention of disease that he became known as "The Father of Microbiology". Pasteur did not create germ theory, but he proves it to be correct. Once he had achieved this, he seems about finding ways to prevent germs, the microorganisms present in the air, from infecting food and people.

He completed his famous experiment proving that microorganisms were present in the air while working for a wine company. He was trying to discover why wine sometimes went bad as it was being made. Once he had found the cause - microorganisms - he began to develop the process which carries his name -

pasteurization. It was perfectly possible to kill all the microorganisms in food by boiling it, a process known as sterilization, but this damaged the taste and the quality of the food. Pasteur's process killed not all, but most, of the microorganisms, with the result that the food needed to be kept cool and eaten or drunk within a limited time. Most importantly, the quality of the food was not harmed by the process. Much of the food we eat today is pasteurized.



His next achievement was to build on the discovery of the British scientist Edward Jenner. Many years earlier, Jenner had discovered a way of giving people resistance to the deadly disease smallpox, by injecting them with a similar disease that was found among cows. The process became known as vaccination. Pasteur applied germ theory to his work and looked at samples of blood taken from healthy and infected animals. He grew bacteria in his laboratory and used it to infect animals. By chance, some of these germs failed to grow well in his laboratory; these weak germs were then used to infect some chickens. Although the chickens suffered at first, they made a complete recovery and could not be infected again. In this way, he discovered a way of increasing resistance to disease. Pasteur developed vaccines for many serious diseases including cholera and anthrax. At that time, these illnesses were certain death for anyone who caught them.

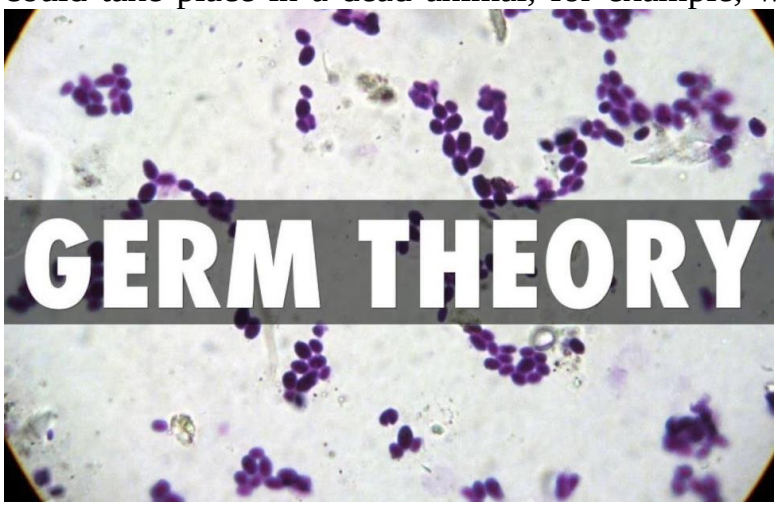
Pasteur's discoveries revolutionized work on infectious diseases. Pasteur's vaccines were different from Jenner's in one important way. Jenner found a weak form of smallpox and transferred it to humans. Pasteur weakened the disease in a laboratory and immunized people with that weakened form. His success allowed a colleague to develop the first vaccine for rabies, which Pasteur used to save the life of a nine-year-old boy. By this act, Pasteur's position as a hero was assured.

Thanks to the work of Pasteur, we now live longer, our food stays fresh longer and we are less likely to die of disease. Indeed, smallpox is no longer found anywhere in the world, due to a huge vaccination programme carried out in the 20th century. This could never have happened without the scientific achievements of The Father of Microbiology.

Text 15. Germ theory

In the past, germ theory was something that caused a lot of discussion and disagreement. Germ theory, the idea that microorganisms or germs were the cause of many diseases, was something that took biologists and the medical profession a long time to accept. Long before the invention of the microscope, biologists were uncertain about the existence of microorganisms, forms of life too small to be seen with the naked eye. Biologists knew that small life forms existed, but could not say where they came

from. The accepted scientific theory was what was known as spontaneous generation (abiogenesis). Quite simply, this stated that living things appeared from nowhere, as if out of nothing, for no reason. According to scientists this happened in things that were decaying: that is, in what remained of things that were dead. Spontaneous generation could take place in a dead animal, for example, when the animal's flesh decayed into maggots. These maggots would then grow into flies or other insects. Mud or dead plants were other places where new life could come into existence.



Near the end of the 17th century the Italian scientist Francesco Redi proved that maggots come from eggs that flies lay in the flesh of dead animals. He carried out one of the first modern scientific experiments in this area. He put meat into three jars. One jar he kept tightly closed so that air could not enter. Another he covered with cloth and the third he left open to the air. Maggots appeared, but only in the open jar. However, belief in spontaneous generation was not destroyed by his experiment and almost 100 years later, the Englishman John Needham carried out a similar experiment. First, he boiled the meat to kill any living organisms that were already there. He kept the air from outside out of his jar and not maggots but microorganisms or germs grew in it. Needham argued that this proved that life could be generated spontaneously from dead material. However, he did not know they were present in the air already in the jar. When Lazzaro Spallanzani in Italy repeated Needham's experiment but removed the air from the jar creating a vacuum with the result that nothing grew on the meat, people argued that he only had proved that spontaneous generation could not take place without air.

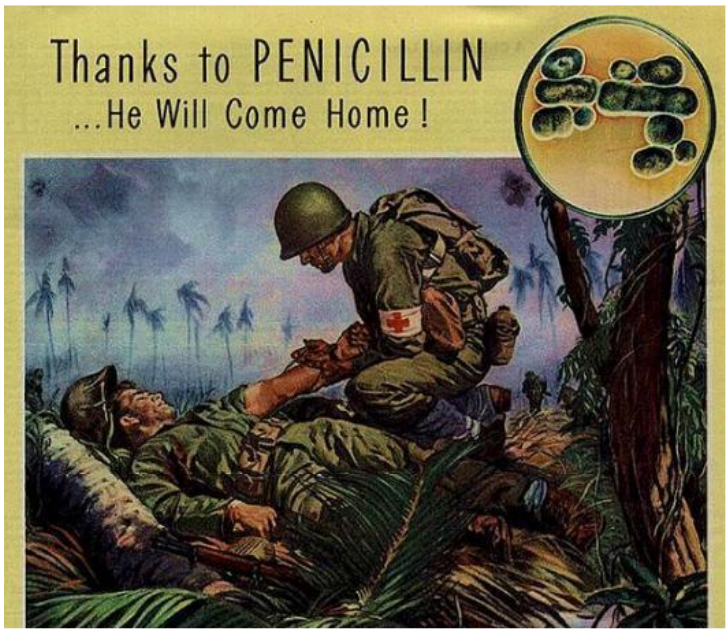
The invention of the microscope did little to weaken the belief in spontaneous generation. The microscope opened up a new world of microorganisms to biologists but they could not explain where they came from and so claimed it was by spontaneous generation.

It was not until the middle of the 19th century that the French biochemist, Louis Pasteur, proved to the world that microorganisms were present in the air and that the idea of spontaneous generation had no place in biology. Pasteur changed Redi's experiment so that the jar was 's'-shaped at the opening. This let the air in, but trapped any microorganisms in the 's' bend. The meat in Pasteur's jars did not generates microorganisms. Only when Pasteur moved the jar, allowing the meat to touch the microorganisms in the trap, did microorganisms start to grow. In this way he showed that growth only occurred when there was contact with the air. This time the scientist's conclusions could not be ignored. The idea of spontaneous generation was finally disproved and from that time on biologists have recognized that microorganisms are present in the air.

Text 16. Antibiotics

Medicine has transformed considerably from the late 1950s. In a decade infections that had been feared as a source of misery and often death, became curable. The greatest reason was the ready availability of penicillin. Alexander Fleming made the initial discovery of the antibacterial properties of the penicillin mould at Mary's Hospital, London in 1928. About to discard a dish contaminated with Penicillium mould, he noticed that the bacteria which prospered elsewhere on the plate had either failed to grow at all or had died around the intrusion. Investigating the phenomenon, he discovered that the mould exuded a small amount of yellow liquid that affected bacteria. Fleming could not find a way to purify the yellow liquid in order to extract the active penicillin.

In March 1940 the German biochemist Ernst Chain and his colleague Norman Heatley at Oxford University succeeded in producing a dry, still impure, material. A test on eight mice in May 1940 showed the efficacy of the chemical in saving animals from fatal infection.



Medical promise and wartime need now transformed penicillin from academic curiosity to scientific obsession. In 1941 the team of Oxford scientists, under the leadership of Howard Florey, successfully showed the potential value or a human patient. Howard Florey and Ernst Chain shared the Nobel Prize in Medicine with Alexander Fleming for the different roles in developing penicillin from an experiment in a Petri dish to a mass-produced drug. By the end of the war, enough penicillin was being produced to meet American, then British and soon European needs.

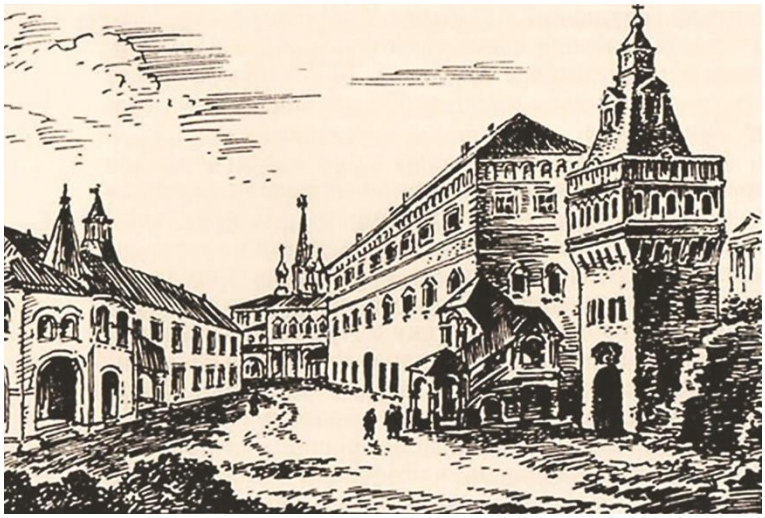
The hope of more effective products led to a huge search for new antibiotics. The families of the tetracyclines and products of the streptomycin confirmed these hopes.

However, the 1950s saw the emergence of bacteria that appeared to be able to resist even the newer drugs. By 1960 methicillin, capable of resisting the dreaded Staphylococcus aureus, had been prepared and was quickly launched. Other ways of making new penicillin were soon developed, and such familiar products as ampicillin and amoxicillin were discovered and widely disseminated. Again, bacteria resistant to methicillin- methicillin-resistant Staphylococcus aureus (MRSA) were shortly discovered, but it was only in the 1990s that they became widespread.

It was soon clear that the attitude to penicillin as wonder drugs, and the abuse that had accompanied it, had fostered the growth of these feared organisms. It was also showed that infections could be managed by antibiotics such as penicillin, but never eradicated.

Text 17. Pharmaceutical Order

The creation of the Pharmaceutical Order was of great importance in the fight against epidemics. The Pharmaceutical Order, the first public medical institution in Russia, was founded around 1620. In the early years of its existence, it was located on the territory of the Moscow Kremlin in a stone building opposite the Chudov Monastery.



In the second half of the XVII century a peculiar system of collecting and harvesting medicinal herbs has developed in the Moscow state. At the walls of the Moscow Kremlin began to create sovereign pharmacy gardens (now Alexander Garden). The number of them is constantly growing. Soon pharmaceutical gardens appeared at Kamenny Bridge, in German Sloboda and on other Moscow suburbs, for example, on the territory of the present Botanical Garden. Landings in them were made in accordance with the orders of the Pharmaceutical order. A significant part of medicinal raw materials for pharmacies was discharged "from beyond the sea" (Arabia, Western Europe - Germany, Holland, England). The Pharmaceutical Order sent its diplomas to foreign specialists who sent the required medicines to Moscow.

The initial task of the Pharmaceutical Order was to provide medical assistance to the king, his family and those close to him. Prescribing medication and its preparation were mated with great severity. The medicine intended for the palace was answered by the doctors who prescribed it, the pharmacists who prepared it, and, finally, by the person to whom it was handed over for transmission “upstairs”. The “selected medical devices” intended for the tsar were kept in a pharmacy in a special room - “kazenka” under the seal of the clerk of the Pharmaceutical Order.

If there was only one pharmacy in the country, the population bought medicines in potions shops, where free trade was carried out by potions. This led to the abuse of poisonous and potent substances. Thus, there is a need for state regulation of the sale of medicines. In this regard, in 1672, the second in the country was opened "... a pharmacy for the sale of all kinds of drugs of all kinds to the people."

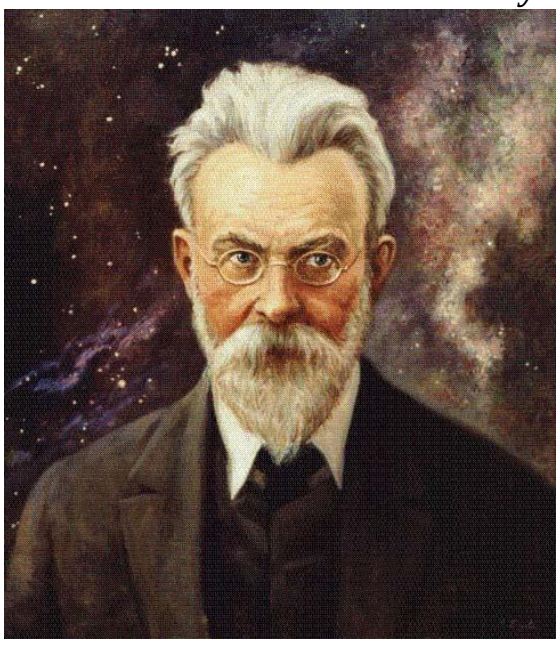
A new pharmacy was located in Moscow too, near the Ambassadorial Order. By a royal decree of February 28, 1673, both pharmacies were granted the right of monopoly trade in medicines.

Pharmaceutical order not only managed pharmacies. By the middle of the XVII century it grew into a large national institution, whose functions have expanded considerably. It was in charge of: inviting doctors (domestic and, together with the Ambassadorial Order, foreign ones), monitoring their work and payment, training and distribution of doctors according to their positions, checking “doctor's tales” (case

histories), supplying troops with medicines and organization of quarantine measures, forensic medical examination, collection and storage of books, management of pharmacies, pharmacy gardens and the collection of medicinal raw materials.

The initial task of the Pharmaceutical Order was to provide medical assistance to the king, his family and those close to him. As I've already said in 1581 the first pharmacy in Russia was established at the royal court, it served only the king and members of the royal family. The pharmacy was located in the Kremlin and for a long time (almost for a century) was the only pharmacy in the Moscow State. In the same 1581, at the invitation of Ivan the Terrible, the court physician of Queen Elizabeth Robert Jacobus (Jacobus Robertus) arrived in Moscow in the royal service. In his retinue were doctors and pharmacists, who served in the Sovereign pharmacy. Thus, initially foreigners (British, Dutch, Germans) worked exclusively in the court pharmacy; pharmacists-professionals from born Russians appeared later.

Text 18. Vladimir Vernadsky



Vladimir Ivanovich Vernadsky was a Russian scientist who was born on 12th March, 1863 in St Petersburg. His most important contributions to science were the development of the ideas of the biosphere (from the Greek word bios meaning life) and the noosphere (from the Greek word noos meaning mind).

He graduated from the Physics and Mathematics Department of St Petersburg University in 1885. From 1890 to 1911 he taught mineralogy and crystallography at the University of Moscow. In 1912 he was made a full member of the Russian Academy of Sciences where he was actively involved for 33 years, until his death in Moscow on 6th January, 1945.

Through his work in mineralogy, Vernadsky became interested in the distribution of chemical elements in the Earth's crust, hydrosphere and atmosphere - the field known as geochemistry. Vernadsky published many papers on the geochemistry of various elements, including the geochemistry of radioactive compounds.

Vernadsky was one of the first scientists to suggest the possibility of using radioactive elements as sources of energy, and he organized a special commission to

look for uranium ores in Russia. In 1916, the first uranium deposits were discovered. But Vernadsky was aware of the danger of putting atomic energy into the hands of man. He said that scientists carried the huge responsibility of making sure their discoveries did not lead to destruction.

However, Vernadsky is probably best known for his development of the idea of the biosphere of the Earth and his ideas on the evolution of the biosphere into the noosphere.

He defined the boundaries of the biosphere by showing that the biosphere includes all the hydrosphere, part of the troposphere - the lowest layer of the atmosphere where most weather changes take place - and the upper part of the Earth's crust down to a depth of two or three kilometres, in short, everywhere that life exists. For Vernadsky, the biosphere had existed since the very beginning of the Earth's history and it was constantly evolving. Our present living world is the product of a long and complex evolution of the biosphere.

Vernadsky believed that the technological activities of mankind were a stage in this evolution. He believed that human reason and combined scientific efforts could overcome the negative results of technology and could lead to a safe future for everyone. This positive evolutionary stage of the biosphere of the Earth is for him the noosphere, the sphere of reason.

In his paper, Several Words on the Noosphere (1944, the last paper he published before his death), Vernadsky outlined the conditions that were required for the creation of the noosphere: equality for all people and an end to wars, poverty and hunger. Today, Vernadsky's vision of the world is more important than ever before.

Text 19. The Russian Academy of Sciences (RAS)

In 1724, Peter the Great established the Academy of Sciences as part of his push for reform to strengthen Russia. He wished to make the country as economically and politically independent as possible and he was aware of how important scientific thought, along with education and culture, was to this. However, unlike other foreign organizations at that time, the Academy was a state institution, which Peter intended should offer scientists from any country the opportunity to do their research in complete freedom, as well as providing the opportunity for students to study under these famous people. The Academy officially opened in 1725.

Over the next three decades, work was done in many fields, among them, work on electricity and magnetism theory. Research enabled the development of mining, metallurgy, and other branches of Russian industry. Work was done in geodesy and cartography and 1745 saw the first atlas of Russia created.

From its earliest days, the Academy carried out mathematical research, which added greatly to the development of calculus, hydrodynamics, mechanics, optics, astronomy, and made discoveries in various fields, such as chemistry, physics and

geology. In addition, expeditions in 1733-1742 and 1760-1770 helped contribute to the discovery of Russia's natural resources.

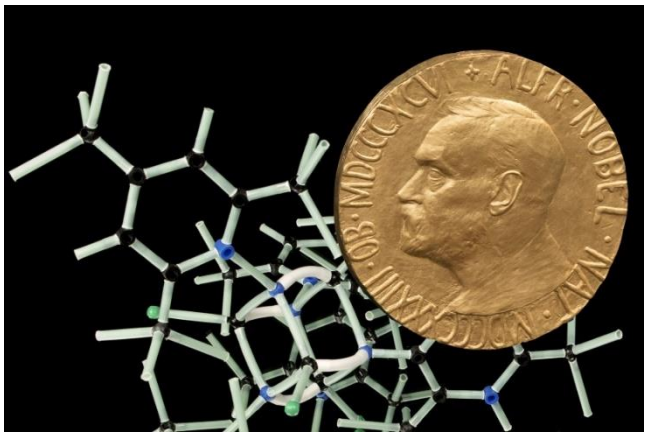
The 19th century was a time of many more contributions from the Academy. The Academy's naturalists were involved in voyages of discovery, including that of F. F. Bellingshausen and M. P. Lazarev in 1820, when Antarctica was discovered. In the fields of mathematics and physics, progress was furthered by N. I. Lobachevsky and his theory of non-Euclidean geometry as well as by P. L. Chebyshev who made progress in the field of probability, statistics and Number Theory. Other notable achievements were the invention of the radio, the creation of the periodic table of the chemical elements, the discovery of viruses and the cell mechanisms of immunity. In the 1890s and early 1900s, I.P. Pavlov carried out experiments which resulted in the discovery of classical conditioning or conditioned reflexes. Clearly, throughout the 18th and 19th centuries and into the 20th century, the Russian Academy led the way in Russian science.

In 1925, the name of the Academy changed to the Academy of Sciences of the USSR. One of the achievements of the Academy was to help set up scientific research centres in all Soviet republics. The Academy also gave scientists the opportunity to work and study in different parts of the USSR and abroad. In 1934, its headquarters were moved to Moscow. At that time, it had 25 member institutions. The Academy continued to grow, reaching a high point of 260 member institutions. In 1991, after the breakup of the USSR, the Academy's name was changed to the Russian Academy of Sciences (RAS).

Today, the RAS supervises the research of a large group of institutions within Russia which focus on different research areas, including philosophy, botany, anthropology, palaeontology and archaeology as well as nuclear physics, astrophysics, mathematics, computer engineering and many others. A special Internet system, called the Russian Space Science Internet (RSSI), which links over 3000 members, has also been set up.

Becoming a member of the RAS is not easy. Only scientific researchers who have done outstanding work or who have great potential are chosen to become members.

Text 20. Russian Nobel Prize winners in Physics and Chemistry



Because of its long history of supporting scientific research and education, Russia has produced a number of internationally recognized leaders in physics and chemistry.

The Russian Academy of Sciences (or the USSR Academy of Sciences, as it was called before 1991), played a major part in all their careers. With one exception, all were members of the Academy, carrying out their research and publishing their findings with the Academy's support.

1956 In 1956, Nikolay N. Semyonov was the first Russian to receive a Nobel Prize for Chemistry for his research into the mechanism of chemical reactions. He was trained as a physicist and chemist. During his career, working alone or with other distinguished scientists like Pyotr L. Kapitsa, he made many important discoveries ancient contributions to chemistry and physics. In 1931, Semyonov became the first director of the Institute of Chemical Physics of the Academy and was also one of the founders of the Moscow Institute of Physics and Technology (MIPT).

1958 The collaboration of Pavel A. Cherenkov, Igor Y. Tamm and Ilya M. Frank resulted in the discovery and description of the Cherenkov-Vavilov effect, a phenomenon which is very important in nuclear physics. For their work they received the Nobel Prize in 1958. All three of the scientists were professors at universities and the Academy's institutes and greatly influenced future generations of scientists.

1962 After receiving his doctoral degree from Leningrad University at the exceptionally young age of 19, Lev D. Landau went on to study abroad When he returned to Russia, he became head of two of the Academy's institutes. Like Semyonov, he was also involved in founding the MIPT. He received the Nobel Prize for Physics in 1962, for his phenomenological theory of superfluidity in helium.

1964 Nikolay G. Basov and Aleksandr M. Prokhorov worked together on a project which led to the development of the laser and their receiving the 1964 Nobel Prize. Both worked at the Lebedev Institute of Physics (Basov was the Director from 1973-1988) and also taught at universities. Even though Prokhorov never became a member of the Academy, the Academy's General Physics Institute was renamed the A. M. Prokhorov General Physics Institute in his honour.

1978 Pyotr L. Kapitsa went to England after he had completed his studies at Petrograd Polytechnic Institute. He studied at Cambridge and also worked on various projects there. He returned to Russia in 1934 and continued his career there. He was also one of the founders of the MIPT. In addition, Kapitsa was a member of the Soviet National Committee of the Pugwash movement, a group of international scientists who wanted to use science for the good of humankind and not for violence and war. Kapitsa won the Nobel Prize for Physics in 1978, for his work on low-temperature physics.

2000 Zhores I. Alferov has been active in physics since graduating from the Electrotechnical Institute in Leningrad. He received the Nobel Prize for Physics in 2000, for the development of the semiconductor heterostructures used in high-speed electronics and optoelectronics.

2003 More recently, Russian Nobel Prize winners in 2003 were Vitaly L. Ginsburg and Alexei A. Abrikosov. Ginsburg, who holds a doctoral degree from Moscow State University, became the director of the Academy's Physics Institute after Igor Tamm. Ginsburg was influenced by Landau, with whom he had worked, and by Tamm, who had been his teacher. Alexei Abrikosov was educated at Moscow State University. He worked at the Landau Institute for Theoretical Physics for over 20 years (1965-1988) and also taught at Moscow State University during that time. They received the Nobel Prize for Physics for pioneering contributions to the theory of superconductors and superfluids.

Vocabulary

A
accompany – сопровождать(ся)
accuracy - точно
accurate - точный
acquire - приобретать
acquired - приобретенный
aggregate – скопление, совокупное количество, соединять(ся)
allergy - аллергия
allow – позволять, разрешать, предоставлять
alloy - сплав
amount - количество
analgesic - обезболевающее
analyze - анализировать
ancient – древний, античный
anther –пыльник, пыльниковый мешок
apply - применять
arrange – приводить в порядок, классифицировать
assign - назначать
assurance – гарантия, уверенность, утверждение
auxiliary – вспомогательный, вторичный, побочный

B
bark - кора
bean-shaped
behind-the-counter
bile - жёлчь
bins – защитные очки
bitter - горький
bladder – мочевой пузырь
bleach - отбеливать
blood - кровь
blotting paper
bond - связь
brain - мозг
break down

C
capsule - капсула
cassava – маниок съедобный
to check – проверять, контролировать
chromatography - хроматография
collaborate - сотрудничать

cooling - охлаждение
combine - сочетать
compassionate – жалеть, сострадать, сочувствовать
compound – состав, сложный, химическое соединение
combustion - горение
conclusion - заключение
contaminate – загрязнять, засорять
convex – выгнутый, выступ, выпуклый, усиленный
cough - кашель
covenant – обремененный, отсутствие гарантии
current - текущий
cut off – отрезать, обрезать
cycle - цикл

D
dates - финики
definition - определение
decoction - отвар
derive – брать начало, происходить
develop – развивать (ся)
development - развитие
detergent – очищающее, моющее средство
discover - открывать
disease – болезнь, заболевание
dispensary - помещение для приготовления ЛС
disruption –разрыв, разделение
dizziness - головокружение
dosage form – лекарственная форма
drop – падение, сброс
droplet - капля
druggist - фармацевт

E
eliminate – исключать, отсеивать
emission – выброс, сброс
endogenous – эндогенный, внутренний
entrusted – поручать, доверять
epicarp – эпикарпий, надплодник
error - ошибка
evaluation - оценка
exhaust – истощаться, опустошать
expenditure – расход, потребление
external - внешний
extemporaneous – приготовленный для немедленного приема

extinction – вымирание, исчезновение
extract - экстракт
eye bath – глазная ванночка, устройство для промывки глаз

F
failure – поражение
fiber - волокно
first-line pharmacist – фармацевт-первостольник
flat - плоский
fluid - жидкость
friction – трение,растирание

G
garlic - чеснок
gas jet – газовый балончик
GDP (Good Distribution Practice) - надлежащая практика дистрибуции (организация сбыта)лекарственных средств
generic –дженерик,
gloves - перчатки
glue - клей
GMP (Good Manufacturing Practice) – надлежащая производственная практика
grains – зерна

H
hairnet – медицинская шапочка
hardwood – широколиственное дерево, древесина твердых пород
harmful – вредный, опасный
hazardous - вредный, опасный
headache – головная боль
health-care-system – система здравоохранения
hoist - подъем
hydrogen - водород
hypothesis - гипотеза

I J
infusion - вливание
inheritance - наследственность
initial - начальный
injection – инъекция
insulation – изоляция, изолирование
irreversible - необратимый
intake – прием, принимать внутрь
internal - внутренний

intestine – кишечник, кишечный тракт
irritant – раздражитель, раздражающий фактор
irritate - раздражать
interaction - взаимодействие
invent - изобретать
invention - изобртение
jelly-like - желеобразный

K L

kidney - почка
label – этикетка, ярлык
launch - запускать
licence – лицензия, патент
lick - лизать
liniment – жидкая мазь, линимент
liquid - жидкость
lyophilic sols –лиофильные золи

M N

mammal - млекопитающие
marshmallow – алтей лекарственный
matter - вещество
measles - корь
measure – мера, степень
meet - соответствовать
mixture - микстура
mortar - ступка
mould - плесень
nasal - назальный
nausea - тошнота
numerous - многочисленный

O

obesity - ожирение
observe - наблюдать
oesophagus - пищевод
off-lable use – незарегистрированный (ЛС), но применяются в редких случаях при орфанных заболеваниях
ointment - мазь
oral – оральный, ротовой
organic - органический
overdose - передозировка
over-the counter drug – без рецепта врача
oxygen - кислород

P

pack - упаковка
package – комплект, контейнер, комплектация
pain - боль
particle - частица
patch - пластырь
pay to – обратить внимание на
pestle – ступка, пестик
petal - лепесток
pipeline – процесс разработки, доработки, подготовки
poisonous - ядовитый
pollen - пыльца
pollination - опыление
pour – лить, наливать
powder – порошок, пудра
predict – прогнозировать, предполагать
pregnant - беременная
prescription - рецепт
property - собственность
procedure - процедура
punch – штамп, пробивать, изюминка
pungent – острый, колючий, жгучий
purpose -цель

Q R

quality - качество
quantity - количество
reduce – уменьшать, сокращать
to be regarded – рассматриваться
relevant –имеющий отношение, соответствующий, подходящий
relieve -облегчать
remedy – средство, лекарство
replace -замещать
repell – отражать, отклонять
requirement(s) - требования
research - исследовать
resin - смола
responsibility - ответственность
to be responsible for – быть ответственным за
retail - розница
reversible- обратимый
rhubarb - ревень
rickets - рахит

rigid – жесткий, устойчивый
root - корень
rubber - резина
rubbish- мусор

U S
unique – уникальный, единственный
sacred – священный, святой
saliva - слюна
sample – образец,
science - наука
scientist - ученый
seed(s) – семя (семяна)
selection – селекция, отбор
semi-solid - полутвердый
sensitivity - чувствительность
severity – тяжесть (заболевания), интенсивность
share – делиться, отдавать (электроны)
side effect – побочный эффект
skin - кожа
slippery - скользкий
soak – вымачивать, впитывать, всасывать
soil - почва
solution - раствор
solvent - растворитель
species -вид
spring- источник, родник
stain – пятно, окраска
starch -крахмал
stem - стебель
sticky – липкий, вязкий, клейкий
storage- хранение
sublingual - подъязычный
substance – субстанция, вещество
suitable - подходящий
survive - выживать
sweat – пот, потеть, выделение жидкости

T
tablet- таблетка
tear away - распылять
technique – техника, метод, способ
throat - горло
tincture - настойка

tissue - ткань
trachea - трахея
trait – особенность, признак
transmit – передавать, переходить
treat - лечить

U V
unique - уникальный
validity – валидность, период действия
vapour – пар, дым
variety - разнообразие
vein - вена
virus - вирус
viscosity - вязкость
voluntarily - добровольно
vomiting - рвота
vow – клятва, молитва, жертвоприношение

W
warrant – гарантия, патент
weight - вес
waste - отходы
water – impermeable - водонепроницаемый
waterlogged – болотистый, залитый водой
withdrawal – синдром отмены, абстиненция, отзыв ЛС с продажи