

**МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ**  
**ОДЕСЬКИЙ НАЦІОНАЛЬНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ**

Кафедра філософії, біоетики та іноземних мов

**ЗАТВЕРДЖУЮ**

Проректор з науково-педагогічної роботи

Едуард БУРЯЧКІВСЬКИЙ

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**МЕТОДИЧНІ РЕКОМЕНДАЦІЇ**  
**ДО ПРАКТИЧНИХ / СЕМІНАРСЬКИХ / ЛАБОРАТОРНИХ ЗАНЯТЬ**  
**З НАВЧАЛЬНОЇ ДИСЦИПЛІНИ**

**«ІНОЗЕМНА МОВА ЗА ПРОФЕСІЙНИМ СПРЯМУВАННЯМ»**

**Рівень вищої освіти:** другий (магістерський)

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**Спеціальність:** 226 «Фармація, промислова фармація»

**Освітньо-професійна програма:** Фармація, промислова фармація

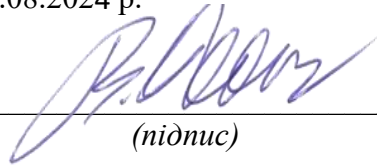
**Затверджено:**

Засіданням кафедри філософії, біоетики та іноземних мов.

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## Практичне заняття № 1

### Тема: GREEK-LATIN TERM ELEMENTS IN THE ENGLISH MEDICAL TERMINOLOGY

**Мета:** ознайомити здобувачів вищої освіти з греко-латинськими терміноелементами, які використовуються у медичній термінології

**Основні поняття:** греко-латинські терміноелементи, англійська медична термінологія

#### План:

- 1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).
- 2. Контроль опорного рівня знань.**  
What is a term element?  
What term elements of Greek origin do you know?  
What term elements of Latin origin do you know?
- 3. Формування професійних вмінь, навичок:**

**Exercise 1. Form terms using the suffixes given below and Greek-Latin term elements:**

**A. Use the suffix *-ic* to write a word for the following definitions.**

1. pertaining to the liver \_\_\_\_\_
2. pertaining to the gallbladder \_\_\_\_\_
3. pertaining to the pancreas \_\_\_\_\_

**B. Use the suffix *-graphy* to write a word for the following definitions.**

4. radiographic study of the liver \_\_\_\_\_
5. radiographic study of the gallbladder \_\_\_\_\_
6. radiographic study of the bile ducts \_\_\_\_\_
7. radiographic study of the pancreas \_\_\_\_\_

**C. Use the suffix *-lithiasis* to write a word for the following definitions.**

8. condition of having a stone in the common bile duct \_\_\_\_\_
9. condition of having a stone in the pancreas \_\_\_\_\_

**Exercise 2. A) Match the following terms to their definitions**

1. primitive	a. one-half or one side of the chest
2. biceps	b. having two forms
3. unify	c. combine into one part
4. dimorphous	d. a muscle with two parts
5. hemithorax	e. occurring first in time

1. erythematous	a. cell with yellow color
2. melanoma	b. having a bluish discoloration
3. xanthocyte	c. darkly pigmented tumor
4. cyanotic	d. red in color
5. leukocyte	e. white blood cell

**B) Match the following prefixes to their meanings**

1. poikilo-	a. good, true, easy
2. eu-	b. straight, correct
3. ortho-	c. false
4. pseudo-	d. few, scanty
5. oligo	e. varied, irregular

**Exercise 3. Fill in the blanks:**

1. Inflammation of the liver is called \_\_\_\_\_.
2. The word biligenesis means the formation of \_\_\_\_\_.
3. A cholelith is a(n) \_\_\_\_\_.
4. Choledochotomy is incision of the \_\_\_\_\_.
5. Cholecystectomy is removal of the \_\_\_\_\_.
6. Hepatomegaly is enlargement of the \_\_\_\_\_.
7. Cholangitis is inflammation of a(n) \_\_\_\_\_.
8. Hepatosplenomegaly is the simultaneous enlargement of both the \_\_\_\_\_ and the \_\_\_\_\_.
9. Pancreatolysis is \_\_\_\_\_ of the pancreas.
10. Pancreatitis is \_\_\_\_\_ of the pancreas.

**Exercise 4. Write words for the following definitions using the word parts provided.  
Each word part can be used more than once.**

**-itis -logy -ptosis nephro- gastr- cardio- neuro-**

1. Inflammation of the stomach \_\_\_\_\_
2. Study of the nervous system \_\_\_\_\_
3. Dropping of the kidney \_\_\_\_\_
4. Study of the kidney \_\_\_\_\_
5. Inflammation of a nerve \_\_\_\_\_
6. Downward displacement of the heart \_\_\_\_\_

**mon(o)- -al dextr(o) end(o) macro cardi cyt -ic ecto micro -ia**

1. Pertaining to a very small cell \_\_\_\_\_
2. A condition in which the heart is outside its normal position \_\_\_\_\_
3. Pertaining to a cell with a single nucleus \_\_\_\_\_
4. Condition in which the heart is displaced to the right \_\_\_\_\_
5. Pertaining to the innermost layer of the heart \_\_\_\_\_
6. Pertaining to a very large cell \_\_\_\_\_
7. Condition in which the heart is extremely small \_\_\_\_\_

**Exercise 5. Explain the medical terms analyzing the term elements**

- Thyroidectomy -
- Thyrotomy -
- Thyroiditis -
- Hypothyroidism -
- Hyperthyroidism -
- Hemithyroidectomy -

**Exercise 6. Write a word that means the opposite of each of the following**

1. humidify \_\_\_\_\_
2. permeable \_\_\_\_\_
3. heterogeneous \_\_\_\_\_
4. exotoxin \_\_\_\_\_
5. microscopic \_\_\_\_\_
6. hyperventilation \_\_\_\_\_
7. postsynaptic \_\_\_\_\_
8. septic \_\_\_\_\_

**Exercise 7. Read USMLE Step 1 Test. Fill in the gaps with the words from the box.  
Explain the words in bold by analyzing the term elements they consist of.**

current	ribosomal	fever	antibiotic
susceptible	bicuspid	shorten	action
culture	p-aminobenzoic	murmur	DNA-dependent

A 67-year-old woman with **congenital** (1) \_\_\_\_\_ aortic valve is admitted to the hospital because of a 2-day history of (2) \_\_\_\_\_ and chills. (3) \_\_\_\_\_ medication is lisinopril. Temperature is 38.0°C (100.4°F), pulse is 90/min, respirations are 20/min, and blood pressure is 110/70 mm Hg. Cardiac examination shows a grade 3/6 systolic (4) \_\_\_\_\_ that is best heard over the second right intercostal space. Blood (5) \_\_\_\_\_ grows viridans streptococci (6) \_\_\_\_\_ to penicillin. In addition to penicillin, an (7) \_\_\_\_\_ **synergistic** to penicillin is administered that may help (8) \_\_\_\_\_ the duration of this patient's drug treatment. Which of the following is the most likely mechanism of (9) \_\_\_\_\_ of this additional antibiotic on bacteria?

- (A) Binding to (10) \_\_\_\_\_ RNA polymerase
- (B) Binding to the 30S (11) \_\_\_\_\_ protein
- (C) Competition with (12) \_\_\_\_\_ acid
- (D) Inhibition of **dihydrofolate** reductase
- (E) Inhibition of DNA gyrase

**4. Підбиття підсумків.**

**Complete the sentence with the correct term(s).**

1. Heat, pain, redness, and swelling are the four major signs of \_\_\_\_\_ .
2. Any abnormal and uncontrolled growth of tissue, whether benign or malignant, is called a(n) \_\_\_\_\_ .
3. The spreading of cancer to other parts of the body is the process of \_\_\_\_\_ .
4. Protrusion of an organ through an abnormal opening is a(n) \_\_\_\_\_ .
5. Death of tissue is called \_\_\_\_\_ .
6. An oncoprotein is a protein associated with a(n) \_\_\_\_\_ .
7. The common name for a helminth is a(n) \_\_\_\_\_ .
8. Another word for treatment is \_\_\_\_\_ .
9. Photochromic eyeglass lenses change color in response to \_\_\_\_\_ .
10. Surgical creation of an opening in the colon is a(n) \_\_\_\_\_ .
11. A transdermal route of administration is through the \_\_\_\_\_ .
12. When a drug has lost its effect at a constant dose, the patient has developed \_\_\_\_\_ .
13. An intravenous injection is given into a(n) \_\_\_\_\_ .
14. With reference to drug interactions, another term for synergy is \_\_\_\_\_ .

**5. Список рекомендованої літератури**

**Основна**

1. ENGLISH FOR PROFESSIONAL PURPOSES. PHARMACY: Course book for 3rd year students of the Faculty of Pharmacy. – Одеса: ОНМедУ, 2023. – 196 с. (комп'ютерна верстка)
2. Збірник вправ по роботі з греко-латинськими елементами в англійській медичній термінології. - Одеса: ОНМедУ, 2023. – 20 с. (комп'ютерна верстка)

<https://info.odmu.edu.ua/chair/philosophy/fileinfo/816/183375>

3. Professional Medical English: Course book for higher education students, speciality 222 Medicine of higher educational institution institutions of IV level of accreditation / Rusalkina, L. H.; Mokriienko, E. M.; Lazor, N. V.; Bermas, O. M. - Odesa: ONMedU, 2023. - 256 с.

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4. Longman Dictionary of Contemporary English  
<https://www.ldoceonline.com/>
5. The International Medical Interpreters Association  
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6. Free Online Term Extractors  
<http://recremisi.blogspot.com/p/online-term-extractors.html>
7. Medical Dictionary Online  
<https://www.online-medical-dictionary.org/>

## Практичне заняття № 2

### Тема: ФАРМАЦЕВТИЧНА БОТАНІКА (ч.1)

**Мета:** ознайомити здобувачів вищої освіти з термінами пов'язаними з фармацевтичною ботанікою, які використовуються у медичній термінології

**Основні поняття:** фармацевтична ботаніка, англійська медична термінологія

#### План:

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

#### **2. Контроль опорного рівня знань.**

1. What makes plants different from other eukaryotes?
2. What have plant cells retained of their prokaryotic ancestors?
3. What similar features does a plant cell share with a typical eukaryotic one?
4. What constituents doesn't a plant cell include compared to an animal one?
5. What are the unique plant cell structures?

#### **3. Формування професійних вмінь, навичок:**

##### **Exercise 1. Answer the questions to the text.**

1. What makes plants different from other eukaryotes?
2. What have plant cells retained of their prokaryotic ancestors?
3. What similar features does a plant cell share with a typical eukaryotic one?
4. What constituents doesn't a plant cell include compared to an animal one?
5. What are the unique plant cell structures?
6. What does a plant cell consist of?
7. Name the constituent parts of the protoplast.
8. How are plant cells interconnected?
9. How are plastids differentiated?
10. What function do chloroplasts provide?
11. Where are chromoplasts usually found?
12. How do they ensure flowers fertilization, fruits and seeds distribution?
13. What function are leucoplasts involved in?
14. What are the products of protoplast's life activities?
15. What ensures the cell osmotic pressure and turgor?

##### **Exercise 2. Mark the following sentences as true (T) or false (F).**

1. The plant cell wall is the living part of a plant.
2. The basic plant cell structure differs from the animal one considerably.
3. Cystolith is a star-shaped crystal formed inside the idioblast.
4. Chromoplasts are mainly of green colour.
5. Plant cells as well as fungi have the protective cell wall structure which is descended from prokaryotes.
6. Vitamin A biosynthesis occurs from chromoplasts containing a large amount of  $\beta$ -carotenes.
7. All the eukaryotes have got plasmodesmata.
8. The plant cell wall doesn't change during its life-cycle.

##### **Exercise 3. Find the synonyms from the tests.**

- petiole –
- bundle –
- kind –

loop-shaped –  
protuberance –  
folded –  
notch –  
needle-shaped –  
to dye –  
embryonic root –

#### **Exercise 4. Match the terms with their definitions.**

1. Lenticel a) becoming woody through the formation and deposit of lignin in cell walls.
2. Stoma b) The plant tissue that has the mechanical function of supporting the plant
3. Lignification c) The conversion of cell walls into a material that repels water, when primary cell walls of epidermis are impregnated with cutin.
4. Suberization d) a body of cells formed on the periderm of a stem, appearing on the surface of the plant as a lens-shaped spot, and serving as a pore.
5. Cutinization e) a modified pore, especially on a leaf, which exudes drops of water.
6. Collenchyma f) a transport tissue found in the vascular bundles of higher plants and functions in the transport of dissolved organic substances.
7. Sliming g) one of the minute orifices or slits in the epidermis of leaves, stems, etc., through which gases are exchanged.
8. Hydathode h) Deposition of suberin on the walls of plant cells, as in the formation of cork tissue.
9. Sclerenchyma i) intramolecular modification that results in mucus formation.
10. Phloem j) a plant tissue that consists of living usually elongated cells with unevenly thickened walls and acts as support especially in areas of primary growth.

#### **4. Підбиття підсумків.**

### **5. Список рекомендованої літератури**

#### **Основна**

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<https://www.imiaweb.org/>
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<http://recremisi.blogspot.com/p/online-term-extractors.html>
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<https://www.online-medical-dictionary.org/>

**Практичне заняття № 3**

**Тема: ФАРМАЦЕВТИЧНА БОТАНІКА (ч.2)**

**Мета:** ознайомити здобувачів вищої освіти з термінами пов'язаними з фармацевтичною ботанікою, які використовуються у медичній термінології

**Основні поняття:** фармацевтична ботаніка, англійська медична термінологія

**План:**

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

1. What are the main types of the plant vegetative organ?
2. What is the function of roots?
3. Where do stems usually occur?
4. Name the main types of roots according to their origin.

**3. Формування професійних вмінь, навичок:**

**Exercise 1. Answer the questions to the text.**

1. What are the typical features of monocots' mature leaves?
2. What is the structure of the eudicots and magnoliids' typical leaf?
3. What kind of compound leaves do some species possess?
4. What are the main leaf venation types in angiosperms?
5. How do they differ?
6. How are the floral organs arranged?
7. What is the perianth? What types are they differentiated into?
8. What are the inner structures of a flower?
9. What is the pericarp and how it is divided?
10. In which fruits does the endocarp consist only of thin-walled succulent cells?

**Exercise 2. Mark the following sentences as true (T) or false (F).**

1. There are recognised four types of roots by their structure.
  2. Each fruit consists of exocarp, mesocarp and endocarp.
  3. Gynoecium is situated in the centre of the flower and terminates the floral axis.
  4. In pinnate leaves the individual leaflets grow on a central stem-like axis.
  5. Stems are found only above the ground.
- 19
6. The stamens called gynoecium are borne in the centre of the flower.
  7. The leaves of monocots, eudicots and magnoliids have a well-defined petiole and elliptical blade (lamina) with reticulate venation.
  8. Perianth can be of two types: calyx and corolla.

**Exercise 3. Find the synonyms from the tests.**

- sprout –
- vast –
- joint –
- binding –
- thread –
- fleshy, juicy –
- extension –
- top –
- detached –
- lamina –

#### **Exercise 4. Fill in the types of inflorescence according their description.**

*Umbel, Thyrsse, Raceme, Corymb, Capitulum, Spike, Panicle*

\_\_\_\_\_ - an elongate, unbranched, indeterminate inflorescence with sessile flowers.

\_\_\_\_\_ - an elongate, unbranched, indeterminate inflorescence with pedicelled flowers.

\_\_\_\_\_ - a branched raceme.

\_\_\_\_\_ - a flat-topped raceme with elongate pedicels reaching the same level.

\_\_\_\_\_ - a flat-topped or rounded inflorescence with the pedicels originating from a common point.

\_\_\_\_\_ (or head) - a dense vertically compressed inflorescence with sessile flowers on a receptacle and subtended by an involucre of phyllaries, characteristic of the Asteraceae.

\_\_\_\_\_ - a many-flowered inflorescence with an indeterminate central axis and many opposite,

lateral dichasia; a mixed inflorescence, with determinate and indeterminate shoots.

#### **4. Підбиття підсумків.**

#### **5. Список рекомендованої літератури**

##### **Основна**

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4. Longman Dictionary of Contemporary English  
<https://www.ldoceonline.com/>
5. The International Medical Interpreters Association  
<https://www.imiaweb.org/>
6. Free Online Term Extractors

<http://recremisi.blogspot.com/p/online-term-extractors.html>

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<https://www.online-medical-dictionary.org/>

**Практичне заняття № 4**  
**Тема: ФАРМАЦЕВТИЧНА БОТАНІКА (ч.3)**

**Мета:** ознайомити здобувачів вищої освіти з термінами пов'язаними з фармацевтичною ботанікою, які використовуються у медичній термінології

**Основні поняття:** фармацевтична ботаніка, англійська медична термінологія

### План:

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

1. What subkingdoms does the Plantae Kingdom comprise?
2. What plant divisions are of particular interest in Pharmaceutical Botany studies?
3. What are the most common plant families?
4. What is a diagnostic feature of the Buckweed family?
5. What inflorescences are characteristic of the Cabbage family?

**3. Формування професійних вмінь, навичок:**

### Exercise 1. Answer the questions:

1. What type of corolla do the flowers of the Legume family possess?
2. What characteristics are typical for the plants of the Celery or Carrot Family?
3. What characteristics are typical for the plants of the Mint or Nettle Family?
4. What type of flowers don't representatives of Asteraceae family have?
5. What type of fruit has opium poppy got?

### Exercise 2. Fill in the blanks with the words given in the box.

vegetatively gametophyte lobules sporophyte  
pinnatisected iodine sporangia Ascomycetes  
dichotomous tetrahedral lamina reticular  
antibiotics needles alga chromatophores

1. \_\_\_\_\_ produced by fungi belonging to *Penicillium* and *Aspergillus* genera are widely used in medicine. They belong to the class of \_\_\_\_\_.
2. A macroscopic \_\_\_\_\_ of brown colour with trunk, rhizoids and foliaceous part rich in alginates and \_\_\_\_\_ is ranked with genus of *Laminaria*.
3. It is known that cells of Chlorophyta division representatives have \_\_\_\_\_ of various shapes.
4. Representatives of Lichenes propagate \_\_\_\_\_ by special formations: isidia, soredia, \_\_\_\_\_.
5. A higher nonvascular plant has distinct alternation of dominant sexual (\_\_\_\_\_) and reduced asexual (\_\_\_\_\_) generations, which indicates that it belongs to Bryophyta.
6. Spore and pollen analysis revealed in the pollen some \_\_\_\_\_ spores with a semicircular base and a \_\_\_\_\_ surface, which may belong to Lycopodiophyta.
7. A plant under examination has a rhizome, big \_\_\_\_\_ leaves with sori and \_\_\_\_\_ on their undersurface. According to this data the plant should be related to Polypodiophyta.
8. It is known that leaves of most gymnosperm species are represented by \_\_\_\_\_. *Ginkgo biloba* has macropodous leathery leaves with solid flabellate \_\_\_\_\_, \_\_\_\_\_ venation and one or several notches along the upper margin.

### Exercise 3. Match the terms with their definitions.

moss 1) a flowerless plant which has feathery or leafy fronds and reproduces by spores released from the undersides of the fronds  
 horsetail 2) a type of fruit (seed capsule) having two fused carpels with the length being more than three times the width  
 fern 3) a small flowerless green plant that lacks true roots, growing in damp habitats and reproducing by means of spores released from stalked capsules  
 ochrea 4) a fruit consisting of a fleshy enlarged receptacle and a tough central core containing the seeds, e.g., an apple or pear  
 silique 5) a plant structure formed of stipules fused into a sheath surrounding the stem, and is typically found in the Polygonaceae  
 pome 6) a nonflowering plant with a hollow jointed stem that bears whorls of narrow

#### **Exercise 4. Study the tests.**

##### ***Polygonaceae – Buckwheat Family***

1. A leaf of a plant under examination has a membranous ochrea that envelops the bottom of internode. Presence of such modified stipules is a diagnostic sign of the following family:  
 A. Buckwheat; B. *Gramineae*; C. *Rosaceae*; D. Legumes; E. *Solanaceae*
2. A leaf has glumaceous ochrea. It clasps bottom of internode and is a modified stipule. This is diagnostic sign of the following family:  
 A. *Polygonaceae*; B. *Gramineae*; C. *Rosaceae*; D. Legumes; E. *Solanaceae*
3. A plant under study has stipules fused together and thus forming a tight tube ochrea, that is a diagnostic feature of the following family:  
 A. *Polygonaceae*; B. *Gramineae*; C. *Rosaceae*; D. *Papaveraceae*; E. *Clusiaceae*
4. A food plant of *Polygonaceae* family is being studied. The plant has reddish stalk, cordatesagittate leaves, its fruit is a trihedral nutlet. Name this plant: A. *Fagopyrum esculentum*; B. *Persicaria bistorta*; C. *Persicaria hydropiper*; D. *Polygonum aviculare*; E. *Rumex confertus*

##### ***Brassicaceae - Cabbage Family***

5. What inflorescences are characteristic of *Cruciferae (Brassicaceae)* family?  
 A. Raceme or panicle; B. Capitulum or corymb; C. Capitulum or umbel; D. Corymb or spike; E. Spadix or panicle
6. Select a *Brassicaceae* family plant that contains glycosides similar in action to those obtained from foxglove:  
 A. *Erysimum canescens*; B. *Arctostaphylos uva-ursi*; C. *Urtica dioica*; D. *Polygonum aviculare*; E. *Primula officinalis*
7. Among harvested plants there was *Capsella bursa-pastoris*, which can be characterized as follows:  
 A. Annual plant, basal leaves - pinnatisected or pinnatipartite, fruit - small triangular heartshaped silique;  
 B. Biennial plant, basal leaves - pinnatilobate, fruit - small round silique;  
 C. Perennial plant, basal leaves - entire-kind, fruit - cylindric silique;  
 D. Annual plant, basal leaves - compound, fruit - segmented silique;  
 E. Biennial plant, basal leaves - membranous, fruit - small winged heart-shaped silique

#### **4. Підбиття підсумків.**

#### **5. Список рекомендованої літератури**

**Основна**

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1. ENGLISH FOR PROFESSIONAL PURPOSES. PHARMACY: Course book for 3rd year students of the Faculty of Pharmacy. – Одеса: ОНМедУ, 2023. – 196 с. (комп'ютерна верстка)
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**Електронні інформаційні ресурси:**

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**Практичне заняття № 5**

**Тема: PATHOLOGICAL PHYSIOLOGY. PART I**

**Мета:** ознайомити здобувачів вищої освіти з особливостями вживання та перекладу медичної термінології у пат.фізіології.

**Основні поняття:** емболізм, бляшка, тромбоз, некроз.

### План:

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What is a fat embolism ?

What is a gas embolism ?

**3. Формування професійних вмінь, навичок:**

#### Exercise 1. Fill in the gaps.

**Fat Embolism.** Fat embolism usually follows (\_\_\_) of bones and other type of (\_\_\_) injury. After the injury, globules of fat frequently enter the circulation. Although traumatic fat embolism occurs usually it is as symptomatic in most cases and (\_\_\_) is removed. But in some severe (\_\_\_) the fat emboli may cause occlusion of pulmonary or (\_\_\_) microvasculature and fat embolism syndrome may result. Fat embolism syndrome typically begins 1 to 3 days after injury during which the raised tissue pressure caused by swelling of damaged tissue (\_\_\_) fat into marrow sinusoids and veins. The features of this (\_\_\_) are a sudden onset of dyspnea, blood stained (\_\_\_), tachycardia, mental confusion with neurologic symptoms including irritability and (\_\_\_), sometimes progress to delirium and coma.

*Fat, Restlessness, Injuries, Sputum, Forces, Cerebral, Syndrome, Tissue, Fracture*

#### Exercise 2. Read the text and explain the terms.

**Gas Embolism.** Two main forms of gas embolism are air embolism and decompression sickness.

Air Embolism occurs when air is introduced into venous or arterial circulation.

Causes of venous embolism include: operations on head and neck, and trauma, obstetrical operations, intravenous infusion of blood and fluid, angiography. The effects of venous air embolism depend upon the following factors: amount of air usually 100-150 ml of air entry is considered fatal, rapidity, position of the patient during or soon after entry of air. The air bubbles may ascend into the superior vena cava if the position of head is higher than the trunk (e.g. in upright position) and reach the brain. General condition of the patient e.g. in severely ill patients, as little as 40 ml of air may have serious results.

Causes of arterial embolism include: cardiothoracic surgery and trauma, paradoxical air embolism, arteriography. The effects of arterial air embolism are certain characteristic features: marble skin due to blockage of cutaneous vessels, air bubbles in the retinal vessels seen ophthalmoscopically, pallor of the tongue due to occlusion of a branch of lingual artery,

coronary or cerebral arterial air embolism may cause sudden death by much smaller amounts of air than in the venous air embolism.

Decompression Sickness. This is a specialized form of gas embolism known by various names such as caisson's disease, divers' palsy or aeroembolism. Decompression sickness is produced when the individual decompresses suddenly, either from high atmospheric pressure to normal level, or from normal pressure to low atmospheric pressure.

Gas Embolism	
Air embolism	
Decompression sickness	
Venous embolism	
Arterial embolism	

**Exercise 3. Read the sentences carefully and find synonyms for the underlined words from the options provided. Choose the word that has a similar meaning to the underlined word in each sentence.**

1. Two main forms of **gas embolism** are air embolism and decompression sickness.
  - a) Fluid obstruction
  - b) Air blockage
  - c) Gas occlusion
  - d) Vascular congestion
2. **Air Embolism** occurs when air is introduced into venous or arterial circulation.
  - a) Wind Occlusion
  - b) Breathing Blockage
  - c) Gas Entrapment
  - d) Ventilation Disorder
3. Causes of **venous embolism** include: operations on head and neck, and trauma, obstetrical operations, intravenous infusion of blood and fluid, angiography.
  - a) Vein congestion
  - b) Blood vessel blockage
  - c) Circulatory clog
  - d) Vascular occlusion
4. The effects of **venous air embolism** depend upon the following factors: amount of air usually 100-150 ml of air entry is considered fatal, rapidity, position of the patient during or soon after entry of air.

- a) Oxygen bubble occlusion
- b) Air bubble blockage
- c) Respiratory embolism
- d) Pulmonary congestion

5. Causes of **arterial embolism** include: cardiothoracic surgery and trauma, paradoxical air embolism, arteriography.

- a) Blood vessel congestion
- b) Artery blockage
- c) Vascular occlusion
- d) Capillary clog

**Exercise 4. Read the sentences carefully and find antonyms (words with opposite meanings) for the underlined words from the options provided. Choose the word that has an opposite meaning to the underlined word in each sentence.**

1. Amniotic Fluid Embolism. This is the most serious, predictable and preventable cause of maternal mortality.

Antonym for "unpredictable":

- a) Foreseeable
- b) Inevitable
- c) Unavoidable
- d) Certain

2. During labour and in the immediate post-partum period, the contents of amniotic fluid may enter the uterine veins and reach right side of the heart resulting in nonfatal complications.

Antonym for "fatal":

- a) Deadly
- b) Severe
- c) Critical
- d) Harmful

3. Notable changes are seen in the lungs such as hemorrhages, congestion, edema, and changes of ARDS, and contraction of right side of the heart.

Antonym for "contraction":

- a) Expansion
- b) Enlargement
- c) Constriction
- d) Reduction

4. These changes are associated with unidentifiable amniotic fluid contents within the pulmonary microcirculation.

Antonym for "identifiable":

- a) Recognizable
- b) Discernible
- c) Apparent
- d) Obscure

**Exercise 5. Match terms with definitions.**

Virchow's triad	in medical terms, refers to a state in which there is an excessive tendency for blood to clot. It is characterized by an imbalance in the body's normal coagulation (clotting) processes, leading to an increased risk of blood clot formation, which can potentially lead to conditions such as deep vein thrombosis, pulmonary embolism, or other thrombotic events.
Hypercoagulability	is a blood clot that forms within a blood vessel. It can obstruct the flow of blood and potentially lead to various medical complications, depending on its location and size.
Endothelial injury/dysfunction	in the medical context, refers to the slowing or stagnation of blood flow within a blood vessel. It is a condition where blood moves more slowly than normal, which can contribute to the activation of clotting factors and increase the risk of blood clot formation.
Thrombus	is a localized dilation or bulging of a blood vessel wall that is caused by a bacterial or fungal infection. It occurs when an infection weakens the vessel wall, leading to the formation of a weakened area that may enlarge and become susceptible to rupture.
Mycotic aneurysm	damage or impaired function of the inner lining (endothelium) of blood vessels. This condition can disrupt the normal regulation of blood flow, promote inflammation, and contribute to the formation of blood clots within the affected vessels.
Stasis	is a medical term that describes the sudden blockage of a blood vessel by a material that travels through the bloodstream and becomes lodged in a vessel, obstructing blood flow. This material, known as an embolus, can be solid, liquid, or gaseous, and it can lead to various complications depending on where it becomes lodged and the size of the vessel affected.

Thromboembolism	is a concept in medicine that describes the three main factors that contribute to the development of thrombosis, which is the formation of blood clots within blood vessels.
Embolism	refers to the process where an embolus, which is a material such as a blood clot or debris, becomes lodged in a smaller branch of an artery known as an arteriole. This can disrupt blood flow to the tissue supplied by the arteriole, potentially leading to tissue damage, ischemia, or other related complications.
Arteriolar embolization	is a medical term that refers to the formation of a blood clot (thrombus) in one location of the body, which then breaks free and travels through the bloodstream to block a blood vessel in another location. This can lead to restricted blood flow, tissue damage, and potentially serious health consequences depending on where the embolism lodges.

#### 4. Підбиття підсумків.

#### 5. Список рекомендованої літератури

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1. ENGLISH FOR PROFESSIONAL PURPOSES. PHARMACY: Course book for 3rd year students of the Faculty of Pharmacy. – Одеса: ОНМедУ, 2023. – 196 с. (комп'ютерна верстка)
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##### Електронні інформаційні ресурси:

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**Мета:** ознайомити здобувачів вищої освіти з особливостями вживання та перекладу медичної термінології у пат. фізіології.

**Основні поняття:** атеросклероз, гломерулонефрит, емфізема.

### План:

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What is rash?

What is auscultation?

**3. Формування професійних вмінь, навичок:**

**Exercise 1. match words with their definitions.**

congestion	coat or covering; one of the enveloping layers of a part, especially one of the coats of a blood vessel or other tubular structure.
tunic	the edge or border of the tissue removed in cancer surgery.
tumor	a small, abnormal patch of tissue on a body part or an organ, may also be a build-up of substances from a fluid, such as cholesterol in the blood vessels.
shin	an excessive or abnormal accumulation of blood or other fluid in a body part or blood vessel
lumen	an area of the skin that has changes in texture or color and may look inflamed or irritated.
margin	the cavity or channel within a tube or tubular organ such as a blood vessel or the intestine.
plaque	listening to the sounds of the body during a physical examination.
rash	a swelling of a part of the body, generally without inflammation, caused by an abnormal growth of tissue, whether benign or malignant.
auscultation	in size or strength as a result of disease or injury or lack of use. synonyms: atrophied, wasted.
diminished	the front of the leg below the knee

**Exercise 2. Fill in the gaps and read about Cholelithiasis:**

**Complaints** He's actually had \_\_\_\_\_ epigastric pain for 2 days, although last night's episode was by far the worst. The pain is \_\_\_\_\_ by nausea and he \_\_\_\_\_ once. He's not a smoker. No history of ulcer disease or \_\_\_\_\_ reflux. No history of gallstones.

*Accompanied Intermittent Vomit Esophageal*

### Physical findings:

Temperature = 101 F

Pulse = 94 and regular

B/P = 120/82 mmHg

Respirations = 18 and without labor

### Physical:

Pupils equally reactive light and accommodation, \_\_\_\_\_ appear slightly icteric. Wonder if he has noticed a change?

Lung fields are clear to auscultation.

Heart sounds are normal, no \_\_\_\_\_ or third heart sounds, PMI is in the mid \_\_\_\_\_ line.

Abdomen is extremely tender, bowel sounds are diminished.

\_\_\_\_\_ exam shows mild prostate enlargement, normal rectal sphincter tone, stool negative for occult blood.

*Sclera Rectal Murmurs Clavicular*

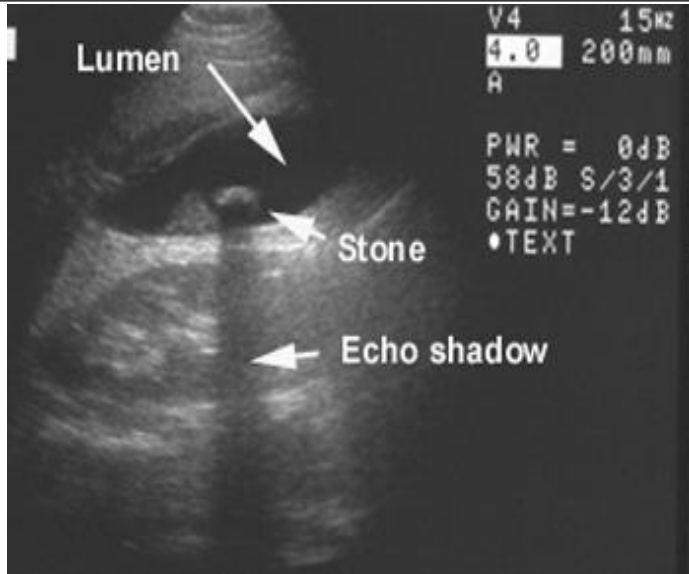


image of gallbladder

Mr. Stein's history, abdominal ultrasound and labs are adding up to something seriously wrong with his liver and/or \_\_\_ tree.

History and physical are consistent with acute gallbladder disease. Location of pain, abdominal tenderness, nausea.

Scleral icterus. Elevated \_\_\_\_.

Abdominal \_\_\_\_ shows a gallstone in the gallbladder and \_\_\_\_ biliary tree. Is there one stuck further down?

Chemistry values are off. Pattern

suggests liver parenchymal and biliary disease. (Which lab value is telling us what part of the \_\_\_\_ is involved?)

CBC suggests an acute inflammatory \_\_\_\_\_. What tells us this?

**Important clinical questions for now are:**

How long will he remain symptomatic, continue to have elevated liver enzymes and bilirubin if a stone has already passed?

*Biliary Bilirubin Dilated Liver Process Ultrasound*

**Exercise 3. Discuss the following topics. Give definitions to the terms**

Continued **biliary stasis**, pain, suffering, etc..

Liver cell **necrosis**.

**Pancreatitis**.

Calcium could drop leading to a fatal arrhythmia (why?)

Problems in the future could include diabetes

**Exercise 4. Read, translate and make differential diagnoses. Say what analyses would you need to make a correct diagnosis. Give definitions to the terms**

Julie Mackenzie is a 3 year old little girl who's brought to you because of a cough and flu-like symptoms. Her aunt is the one with her today because Julie's parents are on a week's vacation. They have given permission for medical care as needed. Julie and her aunt are waiting for you in the examining room.

**Cough:** It's worse when she first gets up of a morning.

Kind of a "hack," and it's non-productive (no sputum).

Neither parent smokes.

Her aunt doesn't smoke.

Julie is on no medication.

She's been to daycare this week, but no one there is sick.

Julie lives in a 4 year old house, and most of it is carpeted.

The family owns a cat.

Julie's parents are on a short Caribbean cruise, and have been gone three days.

**Exam:** Julie is a well nourished little girl having appropriate physical development for three years of age. She is appropriately curious but doesn't want to be separated from her aunt.

**Vital signs:**

T = 99.2

P = 88 and regular  
 BP = 122/74 mmHg  
 R = 18 and regular  
 Mildly reddened pharynx with slight **post nasal drainage**.  
 Mildly enlarged tonsils.  
 Ear drums clear with no fluid  
 No significant cervical lymph **adenopathy**.  
 Mild **wheezing** over both lung fields  
 Heart sounds normal, no **murmurs**.  
 No **abdominal masses**

**Exercise 5. Explain medical terms.**

Eosinophilia-
Osteomyelitis-
Glomerulonephritis-
Aminoacidemia-
Pneumonia-
Obesity-
Splenomegaly-
Hypoglycemia-
Peritoneum-
Albuminosis-

**Exercise 6. Find the synonyms from the tests.**

purulent –  
 thrombus –  
 adipose –  
 change –  
 decompensation –  
 substance –  
 tunic –  
 edge –  
 childbirth –  
 investigation –

**Exercise 7. Fill in the table.**

NOUN	VERB	ADJECTIVE
	investigate	
		exudative
location		
		alterable
	feel	
dilatation		
		moist
	diminish	
	obstruct	
		communicative

#### 4. Підбиття підсумків.

#### 5. Список рекомендованої літератури

##### Основна

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### Практичне заняття № 7

Тема: PATHOLOGICAL PHYSIOLOGY. PART III

**Мета:** ознайомити здобувачів вищої освіти з особливостями вживання та перекладу медичної термінології у пат. фізіології.

**Основні поняття:** розлад нервової системи, лейкопенія.

### План:

**1.Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2.Контроль опорного рівня знань.**

What is hyperpigmentation?

What is appendectomy ?

**3.Формування професійних вмінь, навичок:**

**Exercise 1. Match words to their definitions**

Metoprolol	it is flat with depressed ridges along the sides where the costal cartilages of the 3rd to 7th pairs of ribs articulate inferior to the sternal angle.
Contraindications	term that is often used in healthcare to indicate that something is benign.
Jaw	a feeling of sickness or discomfort in the stomach that may come with an urge to vomit.
Sternum	a medication that lowers your blood pressure and heart rate, making it easier for your heart to pump blood to the rest of your body. It treats high blood pressure. It also prevents chest pain or further damage after a heart attack.
Nauseated	blockage of a passageway.
Cannulae	the movable junction of the bones below the mouth (the mandible) and the bone just above the mouth (the maxilla).
Stable	specific situation in which a drug, procedure, or surgery should not be used because it may be harmful to the person.
Obstruction	the middle muscular layer of the wall of the heart.
Myocardium	good physical health, with no acute or chronic health problems for which medical treatment beyond routine medical care is required
Unremarkable	a thin tube that doctors insert into a person's body cavity, such as their nose, or into a vein.

**Exercise 2. Fill in the gaps.**

Mr. W.G. is a 53-year-old white man who began to experience chest discomfort while playing tennis with a friend. At first he attributed his discomfort to the heat and having had a large breakfast. Gradually, however, discomfort intensified to a crushing sensation in the \_\_\_ area and the pain seemed to spread upward into his neck and lower \_\_\_\_\_. The nature of the pain did not seem to change with deep breathing. When Mr. G. complained of feeling \_\_\_\_\_ and began rubbing his chest, his tennis partner was concerned that his friend was having a heart attack and called 911 on his cell phone. The patient was transported to the ED of the nearest hospital and arrived within 30 minutes of the onset of chest pain. En route to the hospital, the patient was placed on nasal \_\_\_ and an IV D5W was started. Mr. G. received aspirin (325 mg po) and 2 mg/IV morphine. He is allergic to meperidine (rash). His pain has eased slightly in the last 15 minutes but is still significant; was 9/10 in severity; now 7/10. In the ED, chest pain was not relieved by 3 SL NTG tablets. He denies chills.

Patient history showed no \_\_\_\_\_ to thrombolysis. The patient received IV reteplase, IV heparin, \_\_\_\_\_, and lisinopril. Approximately 90 minutes after initiation of reteplase therapy, the patient's chest pain and ST segment elevations had resolved and both heart rate and blood pressure had normalized. The patient was \_\_\_\_\_ until two days after admission when he began to experience chest pain again. Emergency angiography revealed a 95% \_\_\_\_\_ in the left anterior descending coronary artery. No additional \_\_\_\_\_ was at risk—consistent with single-vessel

coronary artery disease and completed AMI. Percutaneous transluminal coronary angioplasty of the vessel was successfully performed, followed by placement of a coronary artery stent. After the stent was placed, the patient received abciximab infusion. Ejection fraction by echocardiogram three days postAMI was 50% and the patient's temperature was 99.5°F. The remainder of the patient's hospital stay was \_\_\_\_\_. He was gradually ambulated, physical activity was slowly increased, and he was discharged eight days post-AMI.

Cannulae, Contraindications, Jaw, Metoprolol, Myocardium, Nauseated, Obstruction, Stable, Sternal, Unremarkable

**Exercise 3. Read, translate and give definitions to the terms**

After administration of low doses of the **diuretics** hydrochlorothiazide (which blocks sodium reabsorption) and triamterene (which reduces potassium excretion), the patient voided 4,500 mL clear, yellow urine during the first 24 hours and another 3,500 mL during the second day post-admission. Bibasilar “crackles” and dependent **edema** also **subsided**. The patient lost three pounds in total body weight. Vital signs were as follows: BP 115/80 (right arm, sitting); P 88 and regular; RR 16 and unlabored; PaO2 (room air) 90; PaCO2 44. H.J. was discharged on day 4 with prescription medicines and orders to pursue a follow-up with a cardiologist as soon as possible.

**Exercise 4. Read, translate and make diagnoses. Give definitions to the terms**

<p>History of Present Illness J.B. is an overweight, 58-year-old man who has had swelling in his left foot and ankle and pain in his left calf for six days. The pain has been getting worse for the past 24 hours. The patient ranks the pain as 8/10. He has made an appointment today with his PCP.</p>	<p>Past Medical History Previous episode of DVT at age 54; treated with warfarin for 1 year Diagnosed with diabetes mellitus type 2, 5 years ago A preliminary diagnosis of DVT is made and the patient is admitted to the hospital for a thorough clinical workup.</p>
<p>Family History Father died at age 63 from <b>myocardial infarction</b> Mother alive at age 80 with diabetes mellitus type 2 Brother, age 56, alive and healthy No family history of <b>venous thromboembolic disease</b> reported</p>	<p>Social History Patient is single and lives alone Works as dean of pharmacy school, 11 years 28 pack-year smoking history, currently smokes 1 pack per day Drinks 3–4 beers/day during the week and a 6-pack/day on weekends No history of illicit drug use</p>
<p>Medications Glyburide 5 mg po QD 3 years Denies taking any <b>over-the-counter</b> or herbal products</p>	<p>Allergies Penicillin causes a rash Cat dander causes watery eyes and sneezing</p>
<p>Physical Examination and Laboratory Tests General J.B. is a pleasant, overweight, white male in moderate acute distress from leg pain. Vital Signs BP 130/80; P 110; RR 16; T 99.8°F; Ht 510 Wt 245 lb; SaO2 98% on room air</p>	<p>Head, Eyes, Ears, Nose, and Throat Atraumatic Pupils equal, round, and reactive to light and accommodation Extra-ocular movements intact Fundi normal Normal sclera Ears and nose clear Tympanic membranes intact Oral mucous membranes pink and moist</p>
<p>Neck Supple</p>	<p>Chest Bilateral wheezing</p>

No <b><u>cervical adenopathy</u></b> Thyroid non-palpable No carotid bruits No jugular venous distension	No crackles
Heart Regular rate and rhythm Distinct S1 and S2 No S3 or S4 No murmurs, rubs, or gallops	Abdomen Soft, non-tender, and non-distended No masses, guarding, rebound, or rigidity No <b><u>organomegaly</u></b> Normal bowel sounds
Genitalia Normal penis and testes	Rectal No masses Heme-negative brown stool
Extremities No clubbing or cyanosis Left foot and ankle swollen Left calf swollen to twice normal size No tenderness, pain, swelling, or redness, right lower extremity	Neurological Alert and oriented No neurologic deficits noted
Doppler Ultrasound Left lower extremity shows no flow of the left posterior tibial vein Normal flow demonstrated within the left common femoral and iliac veins Right lower extremity shows normal flow of the deep venous system from the level of the common femoral to posterior tibial vein	Diagnosis

#### Exercise 5. Explain medical terms.

Hyperpigmentation -
Rheumatoid arthritis -
Hypertension -
Leukopenia -
Vasodilating -
Tachycardia -
Osteoporosis -
Dehydration -
Hypoproteinemia -
Appendectomy -

#### 4. Підбиття підсумків.

#### 5. Список рекомендованої літератури

##### Основна

##### Основна

1. ENGLISH FOR PROFESSIONAL PURPOSES. PHARMACY: Course book for 3rd year students of the Faculty of Pharmacy. – Одеса: ОНМедУ, 2023. – 196 с. (комп'ютерна верстка)

2. Збірник вправ по роботі з греко-латинськими елементами в англійській медичній термінології. - Одеса: ОНМедУ, 2023. – 20 с. (комп'ютерна верстка)

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3. Professional Medical English: Course book for higher education students, speciality 222 Medicine of higher educational institutions of IV level of accreditation / Rusalkina, L. H.; Mokriienko, E. M.; Lazor, N. V.; Bermas, O. M. - Odesa: ONMedU, 2023. - 256 с.

**Додаткова:**

1. Medical English for Academic Purposes, Ю.В. Лисанець, О.М.Беляєва, М.П. Мелащенко 2018, Видавництво Медицина. - 312 с.
2. Lippincott Illustrated Reviews: Pharmacology, Автор Karen Whalen Видавництво Lippincott Williams & Wilkins, 2018. - 576 с.
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**Електронні інформаційні ресурси:**

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**Практичне заняття № 8**

**Тема: Biochemistry (part 1).**

**Мета:** ознайомити здобувачів вищої освіти з ферментами, вітамінами та мінералами англійською мовою; медичними термінами, що стосуються біологічної хімії: їх переклад, особливості словотворення, аналіз елементів греко-латинського походження..

**Основні поняття:** біологічна хімія, білки, ферменти.

### План

- 1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).
- 2. Контроль опорного рівня знань.**

What is a macromolecule?

How are proteins classified?

What is enzyme?

- 3. Формування професійних вмінь, навичок:**

**Exercise 1. Remember roots and suffixes pertaining to biochemistry.**

Root/Suffix	Meaning	Example
cyto-	cell	cytology
lipo-	fat	adipocellular
glyco-	sugar	glycolipid, glucose
iso-	equal, similar	isoenzyme
poli-	multiple	polysaccharides
-ine	relating to, made of	glycine, lysine
-lysis	decomposition, breaking down	glycolysis, electrolysis
-cyte	cell	erythrocyte

**Exercise 2. Read the definitions and choose the proper term given in brackets.**

- \_\_\_\_\_ is the splitting of glycogen in the liver and muscles to pyruvate and lactate in anaerobic conditions with the formation of ATP.
- \_\_\_\_\_ is the splitting of glucose to pyruvate and lactate.
- \_\_\_\_\_ is the synthesis of glycogen from glucose in the liver and muscles.
- \_\_\_\_\_ is the formation of glucose from non-carbohydrate nature of substances.
- \_\_\_\_\_ is produced by the hydrolysis in the intestine disaccharide - lactose.
- \_\_\_\_\_ is the process of resynthesis of glucose from non-carbohydrate natural products.
- \_\_\_\_\_ is formed in almost all cells of the organism, but the highest concentration detected in the liver.
- \_\_\_\_\_ is used for the biosynthesis of triglycerides and phospholipids.

*(Gluconeogenesis, Glycogenesis, glycogenolysis, glycerol phosphate, galactose, glycolysis, glycogen, gluconeogenesis)*

**Exercise 3. Find synonyms in the text to the following words and word combinations.**

Dissoluble, elementary, compound, to consist of, deposit, infuse, to form clots, combine, resistance, iron-containing protein, alternative to, transmit, disintegration, convertible, suppression, characteristic, to cause, watered, to equate with, to give in, warming up.

**Exercise 4. Match the terms with their definition.**

1. Keratin	a) is the iron-containing oxygen-transport metalloprotein in the red blood cells;
------------	---

2. Collagen	b) is a phosphoprotein found in milk and egg yolk;
3. Gelatine	c) is a characteristic constituent of epidermal tissue, such as horn, hair, nails, wool, hoofs and feathers;
4. Elastin	d) a specific protein that acts as biological catalysts;
5. Haemoglobin	e) it is not a complete protein as it lacks an amino acid tryptophan and forms a gel on cooling;
6. Casein	f) can be easily converted to gelatine by boiling and splitting off some amino acids;
7. Enzyme	g) it presents in yellow elastic fibre of the connective tissue, ligaments, and tendons. It is formed in large amount in the uterus during pregnancy.

**Exercise 5. Match the beginnings and endings of the sentences.**

Monosaccharides are classified according to	an inability to convert galactose to glucose.
Carbohydrates are associated with the outer parts of the molecules of membrane proteins and lipids	anaerobic conditions, or when the metabolic machinery is absent for the further oxidation of pyruvate.
Galactosemia is a genetic disease characterized by	the chemical nature of their carbonyl group and the number of their C atoms.
Symptoms of galactosemia include	activity as the glucose concentration rises in diabetes.
The sorbitol pathway is responsible for fructose formation from glucose, and increases in	two molecules of pyruvate with the concomitant new generation of two ATPs.
Glycolysis is the metabolic pathway by which most life forms degrade glucose to	the liver in the period between the consumption of food.
Lactate is the end product of glycolysis under	to form glycoproteins and glycolipids.
Glucagon provides sufficient output of glucose from	failure to thrive, mental retardation, and in some instances death from liver damage.

**Exercise 6. Say whether the following statements are true or false.**

1. Cellulose, which is a part of the food, isn't digested by enzymes of saliva and small intestine.
2. Digestion of proteins in the stomach lasts for 6-8 hours.
3. Pepsin is produced by cells of intestinal mucosa.
4. Hypovitaminosis of vitamin C causes gout.
5. Organ rich in vitamin B12 is pancreas.
6. Hypovitaminosis of vitamin B12 is pernicious anaemia.
7. Toxicity of high doses of folic acid is the same as in other B group vitamins.
8. Hypovitaminosis of vitamin B1 leads to the beriberi disease.

**Exercise 7. Read the text and answer the questions.**

1. What is a macromolecule?
2. What do complex proteins contain?
3. How are proteins classified?
4. How are amino acids divided according to the chemical structure?
5. What is the division of proteins according to the solubility and functional properties?
6. What are the major subclasses of simple proteins?
7. Name the properties of globulins.
8. What are the properties of gliadins?
9. What proteins form conjugated proteins with DNA and porphyrins?
10. What proteins combine with nucleic acids to form nucleoproteins?
11. What group of simple proteins do keratins, collagen and elastins belong to?

12. What are conjugated proteins?
13. What conjugated protein is abundant in tissues and can be found in thymus and glandular organs?
14. What metallic elements do some enzymes contain?
15. What is enzyme?
16. How are enzymes divided according to their chemical reactions?
17. What are the isozymes?
18. What are the types of inhibition of enzymes?
19. What is the reversible inhibition divided into?
20. Name the inhibiting agents of enzymes.

#### **4. Підбиття підсумків.**

#### **5. Список рекомендованої літератури**

##### **Основна**

1. ENGLISH FOR PROFESSIONAL PURPOSES. PHARMACY: Course book for 3rd year students of the Faculty of Pharmacy. – Одеса: ОНМедУ, 2023. – 196 с. (комп'ютерна верстка)
2. Збріник вправ по роботі з греко-латинськими елементами в англійській медичній термінології. - Одеса: ОНМедУ, 2023. – 20 с. (комп'ютерна верстка)  
<https://info.odmu.edu.ua/chair/philosophy/fileinfo/816/183375>
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5. Sabluk A. H., Levandovska L.V. English for medical students. – BCB Medicine 2018. - 576 p.

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<https://www.ldoceonline.com/>
5. The International Medical Interpreters Association  
<https://www.imiaweb.org/>
6. Free Online Term Extractors  
<http://recremisi.blogspot.com/p/online-term-extractors.html>
7. Medical Dictionary Online  
<https://www.online-medical-dictionary.org/>

## Практичне заняття № 9

### Тема: BIOCHEMISTRY. PART II.

**Мета:** ознайомити здобувачів вищої освіти з медичними термінами, що стосуються біологічної хімії: їх переклад, особливості словотворення, аналіз елементів греко-латинського походження.

**Основні поняття:** біологічна хімія, авітаміноз, ферменти.

#### План

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What is Biochemistry?

What does it study?

What vitamins do you know?

**3. Формування професійних вмінь, навичок:**

**Exercise 1. Remember roots and suffixes pertaining to biochemistry.**

Root/Suffix	Meaning	Example
cyto-	cell	cytology
lipo-	fat	adipocellular
glyco-	sugar	glycolipid, glucose
iso-	equal, similar	isoenzyme
poli-	multiple	polysaccharides
-ine	relating to, made of	glycine, lysine
-lysis	decomposition, breaking down	glycolysis, electrolysis
-cyte	cell	erythrocyte

**Exercise 2. Read and translate the tests.**

**1.** Pain along large nervous stems and increased amount of pyruvate in the blood were revealed in the patient. Insufficiency of what vitamin can cause such change?

A B1

B B2

C PP

D Pantothenic acid

E Biotin

**2.** In case of enterobiasis acirhine - the structural analogue of vitamin B2 - is administered. The synthesis disorder of which enzymes does this medicine cause in microorganisms?

A FAD-dependent dehydrogenase

B Cytochrome oxidases

C Peptidases

D NAD-dependent dehydrogenases

E Aminotransferases

3. A 10-year-old girl often experiences acute respiratory infections with multiple spotty haemorrhages in the places of clothes friction. Hypovitaminosis of what vitamin is present at the girl?

- A C
- B B6
- C B1
- D A
- E B2

4. There is observed inhibited fibrillation in the patients with bile ducts obstruction, bleeding due to low level of absorption of some vitamin. What vitamin is in deficit?

- A K
- B A
- C D
- D E
- E Carotene

5. During endotoxemia active forms of the oxygen including superoxide anion radical are formed in the human body. With help of what enzyme is this anion activated?

- A Superoxide dismutase
- B Catalase
- C Peroxidase
- D Glutathione peroxidase
- E Glutathione reductase

6. A patient presents high activity of LDH1,2, aspartate aminotransferase, creatine phosphokinase. In what organ (organs) is the development of a pathological process the most probable?

- A In the heart muscle (initial stage of myocardium infarction)
- B In skeletal muscles (dystrophy, atrophy)
- C In kidneys and adrenals
- D In connective tissue
- E In liver and kidneys

7. While examining the child the doctor revealed symmetric cheeks roughness, diarrhoea, disfunction of the nervous system. Lack of what food components caused it?

- A Nicotinic acid, tryptophan
- B Lysine, ascorbic acid
- C Threonine, pantothenic acid
- D Methionine, lipoic acid
- E Phenylalanine, pangamic acid

8. A 13-year-old boy complains of general weakness, dizziness, tiredness. He is mentally retarded. Increased level of valine, isoleucine, leucine is in the blood and urine. Urine has specific smell. What is the diagnosis?

- A Maple syrup urine disease
- B Addison's disease
- C Tyrosinosis
- D Histidinemia
- E Graves' disease

9. Aspirin has anti-inflammatory effect due to inhibition of the cyclooxygenase activity. Level of what biological active acids will decrease?

- A Prostaglandins
- B Leukotrienes
- C Catecholamines
- D Biogenic amines
- E Iodothyronines

10. Examination of a patient revealed typical presentations of collagenases. This pathology is characterized by increase of the following urine index:

- A Hydroxyproline
- B Arginine
- C Glucose
- D Mineral salts
- E Ammonium salts

11. Marked increase of activity of MB-forms of CPK (creatine phosphokinase) and LDH1 were revealed on the examination of the patient's blood. What is the most likely pathology?

- A Myocardial infarction
- B Hepatitis
- C Rheumatism
- D Pancreatitis
- E Cholecystitis

12. A patient has an increased pyruvate concentration in blood. A large amount of it is excreted with the urine. What vitamin is lacking in this patient?

- A B1
- B E
- C B3
- D B6
- E B2

13. 12 hours after an acute attack of retrosternal pain a patient presented a jump of aspartate aminotransferase activity in blood serum. What pathology is this deviation typical for?

- A Myocardium infarction
- B Viral hepatitis
- C Collagenases
- D Diabetes mellitus
- E Diabetes insipidus

14. A woman who has been keeping to a clean-rice diet for a long time was diagnosed with polyneuritis (beriberi). What vitamin deficit results in development of this disease?

- A Thiamine
- B Ascorbic acid
- C Pyridoxine
- D Folic acid
- E Riboflavin

15. Examination of a patient with frequent haemorrhages from internals and mucous membranes revealed proline and lysine being a part of collagen fibres. What vitamin absence caused disturbance of their hydroxylation?

- A Vitamin C

- B Vitamin K
- C Vitamin A
- D Thiamine
- E Vitamin E

**Exercise 3. Translate the word-combinations from English into Ukrainian.**

Intensified disintegration, increased susceptibility, physical lag, calculi formation, amount of nitrogen, sun impact, probable cause, instantaneous death, vasodilating effect, lapse of time, maple syrup, mentally retarded, participation of vitamin, lenticular opacity, epileptic seizure, potassium cyanide, target cell, change of gene expression, fungi toxins, restore native structure, dizziness and memory impairment.

**Exercise 4. Match terms with definitions**

Diabetes mellitus	3. extremely lethargic or sleepy.
Uneventful	4. the chemical processes that occur within a living organism in order to maintain life.
Comatose	5. a hormone produced in the pancreas by the islets of Langerhans, which regulates the amount of glucose in the blood. The lack of insulin causes a form of diabetes.
Oxidation	6. be developing an infectious disease before symptoms appear.
Insulin	7. a disease of inadequate control of blood levels of glucose.
Protein	8. A molecule that contains two or more amino acids (the molecules that join together to form proteins).
Metabolism	9. A chemical reaction that takes place when a substance comes into contact with oxygen or another oxidizing substance.
Incubating	10. any of a class of nitrogenous organic compounds that have large molecules composed of one or more long chains of amino acids and are an essential part of all living organisms, especially as structural components of body tissues such as muscle, hair, etc., and as enzymes and antibodies.
Peptide	11. not marked by interesting or exciting events.

**Exercise 5. Fill in the gaps.**

Diabetes mellitus Uneventful Comatose Oxidation Insulin Protein Metabolism Incubating Peptide
---

The patient is a 5-year-old boy, who was born in 1967, at term, after an \_\_\_ pregnancy. He was a sickly infant, and did not grow well. On a number of occasions his mother noted that he appeared drowsy, or even \_\_\_\_, and said that there was a “chemical, alcohol-like” smell on his breath, and in his urine. The GP suspected \_\_\_\_, and sent him to the Middlesex Hospital in London for a glucose tolerance test.

Blood samples were also taken for measurement of insulin at zero time and 1 hour after the glucose load. At this time a new method of measuring \_\_\_\_ was being developed, radioimmunoassay (see Chapter 48), and therefore both this and the conventional biological

assay were used. The biological method of measuring insulin is by its ability to stimulate the uptake and \_\_\_\_\_ of glucose in rat muscle in vitro; this can be performed relatively simply by measuring the radioactivity in  $^{14}\text{CO}_2$  after \_\_\_\_\_ duplicate samples of the muscle with [ $^{14}\text{C}$ ]glucose, with and without the sample containing insulin.

As a part of their studies of the new radioimmunoassay for insulin, the team at the Middlesex Hospital performed gel exclusion chromatography of a pooled sample of normal serum, and determined insulin in the fractions eluted from the columns both by radioimmunoassay and by stimulation of glucose \_\_\_\_\_ (graph B). Three molecular mass markers were used; they eluted as follows: Mr 9000 in fraction 10, Mr 6000 in fraction 23, and Mr 4500 in fraction 27.

Since these studies in the 1960s, the gene for human insulin has been cloned. Although insulin consists of two \_\_\_\_\_ chains, 21 and 30 amino acids long, respectively, these are coded for by a single gene, which has a total of 330 base pairs between the initiator and stop codons. As you would expect for a secreted \_\_\_\_\_, there is a signal sequence coding for 24 amino acids at the 5' end of the gene.

### **Exercise 6. Read, translate and give definitions to the terms**

The patient is a 28-week-old baby girl. She was admitted to the **emergency department** in a **coma**, having suffered a **convulsion** after feeding. She had a mild infection and slight **fever** at the time. Since birth she had been a sickly child, and had frequently vomited and become **drowsy** after feeding. She was bottle-fed and at one time cows' milk allergy was suspected, although the problems persisted when she was fed on soya-milk.

On admission she was mildly **hypoglycaemic**, ketonic and her plasma pH was 7.29. Analysis of a blood sample showed normal levels of insulin, but considerable hyperammonaemia (plasma ammonium ion concentration 500  $\mu\text{mol/L}$ ; reference range 40-80  $\mu\text{mol/L}$ ). She responded well to intravenous glucose infusion and rectal infusion of lactulose, regaining consciousness. She had poor muscle tone.

A liver biopsy sample was taken, and the activities of the **enzymes** of urea synthesis (see Chapter 28) were determined, and compared with activities in post-mortem liver samples from six infants of the same age. . She remained well on a high carbohydrate, low protein diet for several days, although the poor muscle tone and muscle weakness persisted. A second liver **biopsy** sample was taken after 4 days and the activity of the enzymes determined again.

### **Exercise 7. Read, translate and discuss a preliminary diagnosis. What analysis you may need to make a correct diagnosis?**

The patient is a 10-year-old Maltese boy. On his birthday his aunt gave him a pie made from fava beans (a local delicacy), and that evening he suffered kidney pain, and passed dark urine. A blood film showed a low red blood cell count and the plasma was red coloured. This problem is not uncommon in Malta, and indeed several of his classmates (all boys) have died when an acute crisis has been precipitated by eating fava beans, or after a moderate fever associated with an infection.

Further studies showed that his erythrocyte glucose 6-phosphate dehydrogenase was only 10% of normal and had a very high  $K_m$  for  $\text{NADP}^+$ . Unlike the patient in case 3, his red blood cell enzyme was as stable to incubation at  $45^\circ\text{C}$  as that from control subjects.

#### **4. Підбиття підсумків.**

#### **5. Список рекомендованої літератури**

##### **Основна**

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3. Webster's Dictionary and Thesaurus

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4. Longman Dictionary of Contemporary English

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5. The International Medical Interpreters Association

<https://www.imiaweb.org/>

6. Free Online Term Extractors

<http://recremisi.blogspot.com/p/online-term-extractors.html>

7. Medical Dictionary Online

<https://www.online-medical-dictionary.org/>

## Практичне заняття № 10

### Тема: BIOCHEMISTRY. PART III.

**Мета:** ознайомити здобувачів вищої освіти з медичними термінами, що стосуються біологічної хімії: їх переклад, особливості словотворення, аналіз елементів греко-латинського походження.

**Основні поняття:** біологічна хімія, метаболічні розлади та ендокринні захворювання.

#### План

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What metabolic and endocrine disorders do you know?

Why does the clinical biochemistry play a vital role in medical science?

**3. Формування професійних вмінь, навичок:**

#### Exercise 1. Read and translate the tests.

1. An infant has apparent diarrhea resulting from improper feeding. One of the main diarrhoea effects is plentiful excretion of sodium bicarbonate. What form of acid-base balance disorder is the case?

A Metabolic acidosis

B Metabolic alkalosis

C Respiratory acidosis

D Respiratory alkalosis

E No disorders of acid-base balance will be observed

2. Buffer capacity of blood was decreased in the worker due to exhausting muscular work. Entry of what acid substance to the blood can this state be explained?

A Lactate

B Pyruvate

C 1,3-bisphosphoglycerate

D alpha-ketoglutarate

E 3-phosphoglycerate

3. A 38-year-old patient suffers from rheumatism in its active phase. What laboratory characteristic of blood serum is of diagnostic importance in case of this pathology?

A C-reactive protein

B Uric acid

C Urea

D Creatinine

E Transferrin

4. A 30 y.o. woman had been ill for a year when she felt pain in the area of joints for the first time, they got swollen and skin above them became reddened. Provisional diagnosis is rheumatoid arthritis. One of the most probable causes of this disease is a structure alteration of a connective tissue protein:

A Collagen

B Mucin

- C Myosin
- D Ovoalbumin
- E Troponin

5. Examination of a 27-year-old patient revealed pathological changes in liver and brain. Blood plasma analysis revealed an abrupt decrease in the copper concentration, urine analysis revealed an increased copper concentration. The patient was diagnosed with Wilson's degeneration. To confirm the diagnosis, it is necessary to study the activity of the following enzyme in blood serum:

- A Ceruloplasmin
- B Carbonic anhydrase
- C Xanthine oxidase
- D Leucine aminopeptidase
- E Alcohol dehydrogenase

6. A patient complains about dyspnoea provoked by the physical activity. Clinical examination revealed anaemia and presence of the paraprotein in the zone of gamma-globulins. To confirm the myeloma diagnosis, it is necessary to determine the following index in the patient's urine:

- A Bence Jones protein
- B Bilirubin
- C Haemoglobin
- D Ceruloplasmin
- E Antitrypsin

7. A 62 y.o. woman complains of frequent pains in the area of her chest and backbone, rib fractures. A doctor assumed myelomatosis (plasmacytoma). What of the following laboratory characteristics will be of the greatest diagnostic importance?

- A Paraproteinemia
- B Hyperalbuminemia
- C Proteinuria
- D Hyperglobulinemia
- E Hypoproteinaemia

8. Pathological changes of the liver and brain were revealed in a 27-year-old patient. The copper concentration is abruptly decreased in blood plasma and increased in the urine. Wilson's disease was diagnosed. Activity of what enzyme in the blood serum should be examined to prove diagnosis?

- A Ceruloplasmin
- B Carbohydrase
- C Xanthinoxidase
- D Leucinamineopeptidaze
- E Alcoholdehydrogenaze

9. A 50-year-old patient complains about general weakness, appetite loss and cardiac arrhythmia. The patient presents with muscle hypotonia, flaccid paralyses, weakened peristaltic activity of the bowels. Such condition might be caused by:

- A Hypopotassaemia
- B Hypoproteinaemia
- C Hyperkalaemia
- D Hypophosphatemia
- E Hyponatremia

10. A 63-year-old woman developed signs of rheumatoid arthritis. Increase of which indicated blood values level could be helpful in proving diagnosis?

A Additive glycosaminoglycans

B Lipoproteids

C Acid phosphatase

D General cholesterol

E R-glycosidase

11. A 35 y.o. patient who often consumes alcohol was treated with diuretics. There appeared serious muscle and heart weakness, vomiting, diarrhoea, AP- 100/60 mm Hg, depression. This condition is caused by intensified excretion with urine of:

A Potassium

B Sodium

C Chlorine

D Calcium

E Phosphates

12. A patient suffers from hepatic cirrhosis. Examination of which of the following substances excreted by urine can characterize the state of antitoxic function of liver?

A Hippuric acid

B Ammonium salts

C Creatinine

D Uric acid

E Amino acids

13. Products of some proteins hydrolysis and modification are the biologically active substances called hormones. Lipotropin, corticotropin, melanotropin and endorphins are synthesized in the hypophysis of the following protein:

A Proopiomelanocortin (POMC)

B Neuroalbumin

C Neurostromin

D Neuroglobulin

E Thyroglobulin

14. During examination of an 11-month-old infant a paediatrician revealed osteoectasia of the lower extremities and delayed mineralization of cranial bones. Such pathology is usually provoked by the deficit of the following vitamin:

A Cholecalciferol

B Thiamine

C Pantothenic acid

D Bioflavonoids

E Riboflavin

15. Disulfiram is widely used in medical practice to prevent alcoholism. It inhibits aldehyde dehydrogenase. Increased level of what metabolite causes aversion to alcohol?

A Acetaldehyde

B Ethanol

C Malonyl aldehyde

D Propionic aldehyde

E Methanol

**Exercise 2. Translate word-combinations from English into Ukrainian.**

Assume, milk curdling, display a marked increase, renal lesion, plentiful excretion, nursing woman, empty stomach, tolerance to glucose, significant decrease, enhance the process, poor wound healing, vision impairment, aversion to alcohol, delayed mineralization, cranial bones, activity of the bowels, be provoked by the deficit, abruptly decreased, prove diagnosis, flaccid paralyses, weakened peristaltic, improper feeding, plentiful excretion.

### Exercise 3. Match terms with definitions

Grizzly	not linked.
Unrelated	a condition in which there is too much acid in the body fluids. It is the opposite of alkalosis (a condition in which there is too much base in the body fluids).
Odour	a watery, typically yellowish fluid stored in the bladder and discharged through the urethra.
Acidosis	inspiring disgust or distaste
Irritable	a sudden, violent, irregular movement of the body, caused by involuntary contraction of muscles and associated especially with brain disorders such as epilepsy, the presence of certain toxins or other agents in the blood, or fever in children.
Urine	a distinctive smell, especially an unpleasant one.
Convulsions	having or showing a tendency to be easily annoyed.

### Exercise 4. Fill in the gaps

*Grizzly, Unrelated, Odour, Acidosis, Irritable, Urine, Convulsions*

The patient is a 9-month-old girl, the second child of \_\_\_\_\_ parents. She was born at term after an uneventful pregnancy, weighing 3.4 kg and was breast fed, with gradual introduction of solids from 3 months of age onward. Her mother reported that, while she liked cheese, meat, and fish, she frequently became \_\_\_\_\_ and \_\_\_\_\_ after meals, and became lethargic, drowsy, and “floppy” after eating relatively large amounts of protein-rich foods. Her \_\_\_\_\_ had a curious \_\_\_\_\_, described by her mother as being “cat-like,” on such occasions.

At 9 months of age she was admitted to the emergency department in a coma, and suffering \_\_\_\_\_. She had been unwell for the last 3 days, with a slight fever, and for the last 12 hours had been refusing all food and drink. At this time, she weighed 8.8 kg, and her body length was 70.5 cm.

Emergency blood tests revealed moderate \_\_\_\_ (pH 7.25) and severe hypoglycaemia (glucose <1 mmol/L); a dipstick test for plasma ketone bodies was negative. A blood sample was taken for full clinical chemistry tests, and she was given intravenous glucose. Within a short time, she recovered consciousness.

She remained in hospital for several weeks, while further tests were performed. She was generally well through this time, but became drowsy and severely hypoglycaemic, and hyperventilated, if she was deprived of food for more than about 8 to 9 hours. Her muscle tone was poor, and she was very weak, with considerably less strength (e.g., in pushing her arms or legs against the paediatrician’s hand) than would be expected for a girl of her age.

On one occasion her blood glucose was monitored at 30-minute intervals over 3 hours from waking, without being fed. It fell from 3.4 mmol/L on waking to 1.3 mmol/L 3 hours later. She was deprived of breakfast again the next day, and again blood glucose was measured at 30-minute intervals for 3 hours during which she received an intravenous infusion of  $\beta$ -hydroxybutyrate (50  $\mu$ mol/min/kg body weight). During the infusion of  $\beta$ -hydroxybutyrate her plasma glucose remained between 3.3 and 3.5 mmol/L.

### Exercise 5. Read, translate and give definitions to the terms

The patient is a 9-month-old boy, the second child of unrelated parents; his brother is 5 years old, fit and healthy. He was born at full term after an uneventful pregnancy, weighing 3.4 kg (the 50th centile), and developed normally until he was 6 months old, after when he showed some **retardation** of development. He also developed a fine scaly skin rash about this time, and his hair, which had been normal, became thin and **sparse**.

At 9 months of age he was admitted to the emergency department in a coma. The acidosis was treated by intravenous **infusion** of bicarbonate, and he recovered consciousness. Over the next few days he continued to show signs of acidosis (rapid respiration), and even after a meal ketone bodies were present in his urine. His plasma lactate, pyruvate, and ketone bodies remained high; plasma glucose was in the low normal range, and his plasma insulin was normal both in the fasting state and after an oral glucose load.

Urine analysis revealed the presence of significant amounts of a number of organic acids that are not normally excreted in the urine, including: Lactate, pyruvate, and alanine, Propionate, hydroxy propionate, and propionyl glycine, Methylcitrate Tiglate and tiglylglycine 3-Methyl crotonate, 3-methylcrotonylglycine, and 3-hydroxyisovalerate

His skin rash and hair loss were **reminiscent** of the signs of biotin deficiency (see Chapter 44), as caused by excessive **consumption** of uncooked egg-white. However, his mother said that he did not eat raw or undercooked eggs at all, although he was fond of hard-boiled eggs and yeast extract (which are rich sources of biotin). His plasma biotin was 0.2 nmol/L (normal >0.8 nmol/L), and he excreted a significant amount of biotin in the form of biocytin (see Figure 44–17) and small biocytin-containing peptides, which are not normally detectable in urine.

He was treated with 5 mg of biotin per day. After 3 days the abnormal organic acids were no longer detectable in his urine, and his plasma lactate, pyruvate, and ketone bodies had returned to normal, although his excretion of biocytin and biocytin-containing peptides increased. At this stage he was **discharged** from hospital, with a supply of biotin tablets. After 3 weeks his skin rash began to clear, and his hair loss ceased.

**Exercise 6. Work in groups. Guess what analysis you need to make a correct diagnosis. What is your preliminary diagnosis?**

The patient is a 4-year-old girl, the only child of nonconsanguineous parents, born at term after an uneventful pregnancy. At 14 months of age she was admitted to hospital with a 1-day history of persistent vomiting, rapid shallow respiration, and dehydration. On admission, her respiration rate was 60/minute and her pulse 178/minute. She responded rapidly to intravenous bicarbonate and a single intramuscular injection of insulin.

The results of a glucose tolerance test 3 days after admission were normal, and her plasma insulin response to an oral glucose load was within the normal range. She was discharged from hospital 7 days after admission, apparently fit and well.

She was readmitted to hospital at 16, 25, 31, and 48 months of age, suffering from restlessness, unsteady gait, rapid shallow respiration, persistent vomiting, and dehydration.

**4. Підбиття підсумків.**

**5. Список рекомендованої літератури**

**Основна**

1. ENGLISH FOR PROFESSIONAL PURPOSES. PHARMACY: Course book for 3rd year students of the Faculty of Pharmacy. – Одеса: ОНМедУ, 2023. – 196 с. (комп'ютерна верстка)

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## Практичне заняття № 11

### Тема 5: ANALITICAL CHEMISTRY-1

**Мета:** розширення, поглиблення й деталізація наукової термінології з аналітичної хімії, формування мовленнєвих компетентностей, розвиток наукового мислення та усного мовлення здобувачів вищої освіти.

**Основні поняття:** аналітична хімія, хімічна реакція, хімічні елементи, хімічні сполуки

#### План:

- 1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).
- 2. Контроль опорного рівня знань.**
  - What is analytical chemistry?
  - What is the purpose of chemical analysis?
  - What methods of chemical analysis do you know?
- 3. Формування професійних вмінь, навичок:** сформувати і закріпити навички пошукового читання та аналізу наукового тексту за темою заняття, закріпити спеціальний вокабуляр.

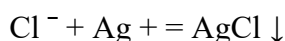
#### Exercise 1. Read the text.

*Звернути увагу здобувачів на правильне читання хімічних елементів і формул.*

*Відпрацювати вміння виділяти ключові слова тексту.*

#### **Analytical chemistry**

Problems of analytical chemistry can be solved using different methods: chemical, physical and physico-chemical. In chemical methods of qualitative analysis, the determined element or ion is transferred to any compound by chemical means, which has certain properties, on the basis of which it is possible to establish that this particular compound was formed. A chemical transformation is called an analytical reaction, and a substance, its boldness, is called a reagent. An example of an analytical reaction is the reaction of chloride ions with silver cations, which results in the formation of a white cheesy precipitate  $\text{AgCl} \downarrow$ . It can be said that chlorides are a reagent for silver cations, and vice versa.



Physical methods of analysis are methods that allow to determine the composition of a substance without resorting to the use of chemical reactions. Physical methods are based on the measurement of any system parameters (optical, electrical, magnetic, thermal), which are a function of composition. Physical methods of analysis include spectral, luminescent, X-ray structural, mass spectrometric methods of analysis. For example, spectral analysis investigates the spectra of radiation that occur when a substance is introduced into the flame of a burner, electric arc, and others. The presence of these elements in the test substance is judged by the presence in the spectrum of lines characteristic of these elements, and their quantitative content is judged by the brightness of the lines.

Physico-chemical methods of analysis are based on the study of physical phenomena that occur during chemical reactions. For example, colorimetry - uses the phenomenon of discoloration of the solution during chem. reactions, conductometry - change of electrical conductivity, etc. It is not always possible to draw a strict line between physical and physicochemical methods. Sometimes they are combined under the general name of "instrumental" methods, as for the performance of certain measurements require "tools" - devices that allow you to accurately

measure the values of certain parameters that characterize certain properties of the substance. Depending on the quantities of the substance operated on when performing analytical reactions, there are: macro-, semi-micro-, micro- and ultramicromethods of qualitative analysis.

In macroanalysis, relatively large amounts of the substance (0.5-1 g) or 20-50 ml of solutions are examined. The reactions are carried out in ordinary test tubes (capacity 10-20 ml), beakers. In microanalysis usually deal with approximately 100 times smaller amounts of test substance, ie, with a few milligrams of solid or a few tenths of a milliliter solution. At the same time use highly sensitive reactions that allow to detect the presence of individual components, even with a small content of them in the test substance. The reactions are performed either by microcrystalline or drip methods.

In the analysis of microcrystalline reactions are usually carried out on a glass slide and the presence of the detected ion (element) is judged by the shape of the formed crystals, examined under a microscope.

The drip method uses reactions that are accompanied by a change in the color of the solution or the formation of colored precipitation. The reactions are most often performed on a strip of filter paper, applying to it in a certain sequence dropwise the test solution and reagents. As a result of the reaction on paper, a colored spot is obtained, the color of which is judged by the presence of the detected ion in the test solution.

Semi-microanalysis occupies an intermediate position between macro- and microanalysis. The amount of test substance in this method is approximately 50 mg of solid or 1 ml of solution.

When working on the semi-micro method, basically, the whole system of macroanalysis with sequential separation and detection of ions is preserved, but the operations are performed with small amounts of substance using special methods and equipment.

In ultramicroanalysis, less than 1 mg of the substance is tested. Almost all analysis operations are performed under a microscope.

### **Exercise 2. Answer the questions.**

*Надати можливість здобувачам оцінити правильність відповідей на питання їхніх колег*

1. What is an analytical reaction?
2. What methods do allow to determine the composition of a substance without resorting to the use of chemical reactions?
3. What is investigated in spectral analysis?
4. What methods of analysis are based on the study of physical phenomena that occur during chemical reactions?
5. What can you tell about colorimetry?
6. What can you tell about conductometry?
7. What methods of qualitative analysis are distinguished depending on the amount of substance when performing analytical reactions?
8. What reactions are used in drip method?
9. What can you tell about semi-microanalysis?
10. What can you tell about ultramicroanalysis?

### **Exercise 3. Match the terms with their definitions.**

*Звернути увагу здобувачів на ключові слова, за якими можна швидко знайти правильний відповідник*

<b>1. Electrolytes</b>	a) are in aqueous solutions dissociate only partially, and a dynamic equilibrium is established in the solution between undissociated molecules and ions.
<b>2. Cations</b>	b) are negatively charged ions
<b>3. Anions</b>	c) are positively charged ions
<b>4. Strong electrolytes</b>	d) is detection or "discovery" of individual elements or ions that are part of substances
<b>5. Weak electrolytes</b>	e) are substances that decompose in solutions or melts into ions
<b>6. Salt effect</b>	e) is determination of the quantitative content of individual components of the test substance.
<b>7. Protolytic equilibrium</b>	f) is equilibrium constant corresponding to the dissociation of a weak electrolyte
<b>8. Qualitative analysis</b>	g) are in aqueous solutions are dissociated almost completely
<b>9. Quantitative analysis</b>	h) is called increasing the solubility of salts in the system "sediment-solution" when adding to the system of other strong electrolytes.
<b>10. Dissociation constant</b>	i) is equilibrium in which the proton - hydrogen ion $H^+$ participates

**Exercise 4. Say whether the following statements are true or false.**

- 1) In this regard, electrolytes can be divided into two groups - strong and weak electrolytes.
- 2) The dynamic equilibrium between undissociated molecules and ions is subject to the law of passive masses.
- 3) The value of  $\alpha$  depends on the nature of the electrolyte, the nature of the solvent.
- 4) Strong electrolytes when dissolved in water completely dissociate into ions - the process of their dissociation is irreversible ( $\alpha = 1$  or 100%).
- 5) Ion pairs (ion associates), in contrast to molecules, retain ion charges, and the distance between ions isn't greater than the interatomic distance in molecules and ionic crystals
- 6) All chemical reactions can be divided into reversible and irreversible reactions.
- 7) The precipitation of sparingly soluble compounds with the joint reagent occurs stepwise.
- 8) The processes of ionization and dissociation of substances in solutions aren't explained by the interaction of the solute with solvent molecules.
- 9) In solutions of weak acids it is necessary to consider that all acid molecules break down into ions.
- 10) Buffer solutions are solutions that are able to maintain a constant pH value when adding small amounts of acids or bases, as well as when diluting them with water.
- 11) The minimum buffer capacity is observed in such solutions, which contain equal concentrations of weak acid and its salt or weak base and its salt.
- 12) The drip method uses reactions that are accompanied by a change in the color and smell of the solution or the formation of colored precipitation.
- 13) Analytical reactions can be performed "dry" and "wet".

**Exercise 5. Complete the abstract using the words below.**

base, gravimetry, formulas, acid, weights, volume, methods, titrant, reaction, titrimetry
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## TITRIMETRIC METHODS OF ANALYSIS

Titrimetry, in which we measure the 1 \_\_\_\_\_ of a reagent reacting stoichiometrically with the analyte, first appeared as an analytical method in the early eighteenth century. Unlike gravimetry, 2 \_\_\_\_\_ initially did not receive wide acceptance as an analytical technique. Many prominent late-nineteenth century analytical chemists preferred gravimetry over titrimetry and few of the standard texts from that era include titrimetric methods. By the early twentieth century, however, titrimetry began to replace 3 \_\_\_\_\_ as the most commonly used analytical method. Interestingly, precipitation gravimetry developed in the absence of a theory of precipitation. The relationship between the precipitates mass and the mass of analyte, called a gravimetric 4 \_\_\_\_\_, was determined experimentally by taking known masses of analyte (an external standardization). Gravimetric factors could not be calculated using the precipitation reactions stoichiometry because chemical 5 \_\_\_\_\_ and atomic 6 \_\_\_\_\_ were not yet available! Unlike gravimetry, the growth and acceptance of titrimetry required a deeper understanding of stoichiometry, thermodynamics, and chemical 7 \_\_\_\_\_. By the early twentieth century the accuracy and precision of titrimetric 8 \_\_\_\_\_ were comparable to that of gravimetry, establishing titrimetry as an accepted analytical technique.

Titrimetric methods are classified into four groups based on the type of 9 \_\_\_\_\_ involved. These groups are acid–base titrations, in which an acidic or basic titrant reacts with an analyte that is a 10 \_\_\_\_\_ or an 11 \_\_\_\_\_; complexometric titrations involving a metal–ligand complexation reaction; redox titrations, where the 12 \_\_\_\_\_ is an oxidizing or reducing agent; and precipitation titrations, in which the analyte and titrant react to form a precipitate.

#### 4. Підбиття підсумків.

#### 5. Список рекомендованої літератури

##### Основна

1. ENGLISH FOR PROFESSIONAL PURPOSES. PHARMACY: Course book for 3rd year students of the Faculty of Pharmacy. – Одеса: ОНМедУ, 2023. – 196 с. (комп'ютерна верстка)
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<https://info.odmu.edu.ua/chair/philosophy/fileinfo/816/183375>
3. Professional Medical English: Course book for higher education students, speciality 222 Medicine of higher educational institution institutions of IV level of accreditation / Rusalkina, L. H.; Mokriienko, E. M.; Lazor, N. V.; Bermas, O. M. - Odesa: ONMedU, 2023. - 256 с.

##### Додаткова:

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4. Raymond Murphy. English Grammar in Use. Cambridge University Press, 2019. – 380 p.
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**Електронні інформаційні ресурси:**

1. Одеський національний медичний університет: <https://onmedu.edu.ua/>
2. Інформаційні матеріали: <http://www.info.odmu.edu.ua>
3. Webster's Dictionary and Thesaurus  
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4. Longman Dictionary of Contemporary English  
<https://www.ldoceonline.com/>
5. The International Medical Interpreters Association  
<https://www.imiaweb.org/>
6. Free Online Term Extractors  
<http://recremisi.blogspot.com/p/online-term-extractors.html>
7. Medical Dictionary Online  
<https://www.online-medical-dictionary.org/>

## Практичне заняття № 12

### Тема 5: ANALITICAL CHEMISTRY-2

**Мета:** розширення, поглиблення й деталізація наукової термінології з аналітичної хімії, формування мовленнєвих компетентностей, розвиток наукового мислення та усного мовлення здобувачів вищої освіти.

**Основні поняття:** аналітична хімія, хімічна реакція, хімічні елементи, хімічні сполуки

#### План:

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What is analytical chemistry?

What is the purpose of chemical analysis?

What methods of chemical analysis do you know?

**3. Формування професійних вмінь, навичок:** сформувати і закріпити навички пошукового читання та аналізу наукового тексту за темою заняття, закріпити спеціальний вокабуляр.

#### Exercise 1. Key words

*Необхідно звернути увагу здобувачів на морфологічну приналежність термінологічних слів та словотворчі терміноелементи*

Verbs	Nouns	Adjectives	Adverbs	Conjunctions/ Prepositions
appear	acid	acid-base	easily	according to
determine	advantage	aqueous	sufficiently	both ... and
disappear	sample	available		by means of
include	content	soluble		without
indicate	fraction	hydrochloric		
perform	investigation	rapid		
process	starch	obtainable		
require	potassium	potable		
consists of	precipitate	qualitative		
vanish	presence	quantitative		

#### Exercise 2. Read the tests:

*Необхідно відпрацювати уміння виділяти ключові слова тестів*

**1.** What titrimetric method of analysis requires the use of both external and internal indicators?

A. Nitritometry

B. Alkalimetry

C. Complexometric titration

D. Permanganometry

E. Argentometry

**2.** By means of photoelectrocolorimetric analysis the concentration of the following can be determined:

A. Colored solution

B. Turbid solution

C. Optically active substance

D. Colorless solution

- E. Any type of solution
3. To determine qualitative content of a drug, the drug sample was processed with 2M solution of HCl. White precipitate soluble in aqueous ammonia solution was formed. This analytical effect indicates the presence of the following cations:
- A. Silver(I)
  - B. Lead(II)
  - C. Mercury(I)
  - D. Mercury(II)
  - E. Tin(II)
4. In photometric analysis the series of 6-8 standard solutions is used:
- A. To build a calibration curve
  - B. To assess determination method
  - C. To simplify working method
  - D. To choose cuvettes
  - E. To choose optical filter
5. Ammonium iron(III) sulfate can be used as an indicator in:
- A. Argentometry, Volhard method
  - B. Argentometry, Mohr method
  - C. Alkalimetry
  - D. Acidimetry
  - E. Complexometric titration
6. Quantitative content of oxalic acid can be determined by means of permanganometry. How to determine equivalence point for this kind of titration?
- A. When titrate changes its color after another drop of process solution is added
  - B. With redox indicator diphenylamine
  - C. With pH indicator
  - D. With specific indicator
  - E. With adsorption indicator
7. Specify what method of redox titration requires the use of specific indicator – starch – to fix the end point:
- A. Iodometry
  - B. Permanganometry
  - C. Nitritometry
  - D. Cerimetry
  - E. Bromatometry
8. What solution can be used to determine the presence of chloride ions in the potable water?
- A. Silver nitrate
  - B. Iodine
  - C. Potassium bromate
  - D. Sodium hydroxide
  - E. Ammonia
9. A specialist of the analytical laboratory performs direct iodometric determination of ascorbic acid. What indicator is used in this case?
- A. Starch
  - B. Methyl orange
  - C. Diphenylamine
  - D. Phenolphthalein
  - E. Methyl red
10. What indicator is used for fixing the endpoint of mercurimetric titration?
- A. Thiocyanate complexes of iron(III)
  - B. Fluorescein

- C. Eosin
- D. Murexide
- E. Potassium chromate

**Exercise 3. Find synonyms of the following words in the tests:**

*Необхідно звернути увагу здобувачів на необхідність морфологічної відповідності синонімів*

vanish	<i>disappear</i>	next	<i>following</i>
carry out	<i>perform</i>	plus point	<i>advantage</i>
demand	<i>require</i>	show	<i>indicate</i>
occur	<i>appear</i>	research	<i>investigation</i>

**Exercise 4. Fill the table with the missing parts of speech:**

<b>verb</b>	<b>noun</b>	<b>adjective</b>	<b>adverb</b>
<i>ease</i>	<i>easiness</i>	<i>easy</i>	<i>easily</i>
<i>direct</i>	<i>direction</i>	<i>direct</i>	<i>directly</i>
<i>present</i>	<i>presence</i>	<i>present</i>	<i>presently</i>
<i>indicate</i>	<i>indication, indicator</i>	<i>indicative</i>	<i>indicatively</i>
<i>require</i>	<i>requirement</i>	<i>required</i>	
<i>vary</i>	<i>variety</i>	<i>various</i>	<i>variously</i>
<i>perform</i>	<i>performance</i>	<i>performing</i>	
<i>include</i>	<i>inclusion</i>	<i>inclusive</i>	<i>inclusively</i>
<i>follow</i>	<i>follower</i>	<i>following</i>	

**Exercise 5. Read the definitions and choose the proper term given in brackets:**

amide; colorimetry; evaporation; permanganatometry; qualitative analysis; quantitative analysis; titration end point; titrimetric method

1. The titration end point – the point during a titration when an indicator shows that the amount of reactant necessary for a complete reaction has been added to a solution.
2. Amide, any member of either of two classes of nitrogen-containing compounds related to ammonia and amines.
3. The qualitative analysis – the detection or "discovery" of individual elements or ions that are part of substances.
4. Evaporation is the process of a substance in a liquid state changing to a gaseous state due to an increase in temperature and/or pressure.
5. Colorimetry – uses the phenomenon of discoloration of the solution during chemical reactions.
6. Titrimetric method is a method of quantitative analysis based on the measurement of the volume of a solution with a precisely known concentration of a reagent (the titrant) required for reaction with a given amount of a substance being determined (the analyte).
7. Permanganatometry is a redox titration that involves the use of permanganates to measure the amount of analyte present in unknown chemical samples.
8. The quantitative analysis – determination of the quantitative content of individual components of the test substance.

**Exercise 6. Complete the abstract using the words and phrases below.**

an analytical reaction; chemical methods; conductometry; physical methods; physico-chemical methods; a reagent; spectral analysis.

In chemical methods of qualitative analysis, the determined element or ion is transferred to any compound by chemical means, which has certain properties, on the basis of which it is

possible to establish that this particular compound was formed. A chemical transformation is called an analytical reaction, and a substance, its boldness, is called a reagent.

Physical methods of analysis are methods that allow to determine the composition of a substance without resorting to the use of chemical reactions. These methods are based on the measurement of any system parameters (optical, electrical, magnetic, thermal), which are a function of composition. They include spectral, luminescent, X-ray structural, mass spectrometric methods of analysis. For example, spectral analysis investigates the spectra of radiation that occur when a substance is introduced into the flame of a burner, electric arc, and others.

Physico-chemical methods of analysis are based on the study of physical phenomena that occur during chemical reactions. For example, conductometry - change of electrical conductivity, etc.

#### **4. Підбиття підсумків.**

#### **5. Список рекомендованої літератури**

##### **Основна**

1. ENGLISH FOR PROFESSIONAL PURPOSES. PHARMACY: Course book for 3rd year students of the Faculty of Pharmacy. – Одеса: ОНМедУ, 2023. – 196 с. (комп'ютерна верстка)
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6. Free Online Term Extractors  
<http://recremisi.blogspot.com/p/online-term-extractors.html>
7. Medical Dictionary Online  
<https://www.online-medical-dictionary.org/>

## Практичне заняття № 13

### Тема 5: ANALITICAL CHEMISTRY-3

**Мета:** розширення, поглиблення й деталізація наукової термінології з аналітичної хімії, формування мовленнєвих компетентностей, розвиток наукового мислення та усного мовлення здобувачів вищої освіти

**Основні поняття:** аналітична хімія, хімічна реакція, хімічні елементи, хімічні сполуки

#### План:

- 1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).
- 2. Контроль опорного рівня знань.**  
What does titrimetric method require?  
What is photoelectrocolorimetric analysis?  
What is photometric analysis?
- 3. Формування професійних вмінь, навичок:** сформувати і закріпити навички пошукового читання та аналізу наукового тексту за темою заняття, закріпити спеціальний вокабуляр.

#### Exercise 1. Key words

*Необхідно звернути увагу здобувачів на морфологічну приналежність термінологічних слів та словотворчі терміноелементи*

verbs	nouns	adjectives
carry out	aim	acetic
decolorize	alkali	analytical
define	bond	carmine-red
dissolve	compound	emerald-green
lead	flame	insoluble
reduce	sedimentation	neutral
separate	solubility	resulting
suffice	solution	standardized

#### Exercise 2. Read the tests:

*Необхідно відпрацювати уміння виділяти ключові слова тестів*

1. Reaction of sodium ions with potassium hexahydroxoantimonate (V) in neutral medium produces precipitate. Specify the color of this precipitate:  
A. White    B. Red    C. Yellow    D. Green    E. Blue
2. Reaction with potassium permanganate is used to detect reducing anions. Specify the anion that decolorizes potassium permanganate:  
A. Sulfite    B. Carbonate    C. Tetraborate    D. Sulfate    E. Arsenate
3. Specify the substance that can be determined by means of polarimetry:  
A. Glucose  
B. This method will suffice for any substance  
C. Sulfuric acid  
D. Sodium chloride

**E. Benzene**

4. A solution of hydrogen peroxide in an acid medium was added into investigated solution, leading to blue coloring of the resulting solution. This analytical effect indicates the presence of the following anion:

- A.**  $\text{Cr}_2\text{O}_7^{2-}$     **B.**  $\text{MnO}_4^-$     **C.**  $\text{C}_2\text{O}_4^{2-}$     **D.**  $\text{NO}_3^-$     **E.**  $\text{Cl}^-$

5. Total content of chloride, bromide, and iodide ions in the investigated solution can be quantitatively determined with the following titrant:

- A.** Silver nitrate solution  
**B.** Potassium dichromate solution  
**C.** Sodium thiosulfate solution  
**D.** Potassium permanganate solution  
**E.** Sodium nitrite solution

6. Gravimetry (precipitation method) is used for quantitative determination of sulfates in potable water. What substance should be used as precipitator for sulfates?

- A.**  $\text{BaCl}_2$     **B.**  $\text{KCl}$     **C.**  $\text{MgCl}_2$     **D.**  $\text{NaCl}$     **E.**  $\text{NH}_4\text{NO}_3$

7. Solution under analysis received chloroform and, drop by drop, chlorine water. Chloroform layer colored orange, which indicates the presence of:

- A.** Bromide ions  
**B.** Iodide ions  
**C.** Sulfite ions  
**D.** Sulfate ions  
**E.** Nitrate ions

8. In titration analysis aimed at determining the substances by means of mercurimetry the following substance can be used as the indicator:

- A.** Diphenylcarbazide  
**B.** Potassium chromate  
**C.** Eriochrome black T  
**D.** Starch  
**E.** Tropaeolin OO

9. The Mohr method is used to determine mass concentration of sodium chloride in an isotonic solution. Titration is carried out with the following indicator:

- A.** Potassium chromate  
**B.** Fluorescein  
**C.** Ammonium iron (III) sulfate  
**D.** Diphenylcarbazone  
**E.** Ferroin

10. In the qualitative analysis that involves precipitation of sulfates of the third analytical group cations ( $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ) the solubility of sulfates can be reduced by adding:

- A.** Ethyl alcohol  
**B.** Distilled water  
**C.** Benzene  
**D.** Chloroform  
**E.** Amyl alcohol

11. Potassium dichromate solution was added into a solution obtained after the precipitate consisting of group II chloride cations was processed with hot water. Yellow precipitate was produced; the precipitate is insoluble in acetic acid, but soluble in alkali. What cations were present in the solution under investigation?

- A. Lead (II)
- B. Mercury (II)
- C. Barium
- D. Silver (I)
- E. Calcium

12. Thiocyanatometric titration method requires secondary standard solution of potassium thiocyanate. This solution is standardized with standard solution of:

- A. Silver nitrate
- B. Hydrochloric acid
- C. Sulfuric acid
- D. Iron (II) sulfate
- E. Copper (II) nitrate

13. In potentiometric titration the following indicator electrode is used for quantitative determination of chloride and borate acids in their mixture:

- A. Glass
- B. Silver-chlorine
- C. Silver
- D. Platinum
- E. Calomel

14. During reaction of silver cations identification first HCl and then ammonia solution have been added to the solution. What compound was produced as the result?

- A.  $[\text{Ag}(\text{NH}_3)_2]\text{Cl}$
- B.  $[\text{Ag}_2(\text{NH}_3)_3]\text{Cl}$
- C. AgOH
- D. AgCl
- E.  $[\text{Ag}(\text{NH}_3)_3]\text{Cl}$

15. In a chemical analytical laboratory a chemist investigates a solution of anion mixture. When antipyrin solution is added it colors emerald-green. This analytical effect signifies presence of the following anions:

- A. Nitrite    B. Nitrate    C. Acetate    D. Tartrate    E. Citrate

**Exercise 3. Find synonyms of the following words in the tests:**

*Необхідно звернути увагу здобувачів на необхідність морфологічної відповідності синонімів*

divide		be enough	
notice		goal	
obtain		cumulative	
diminish		combination	

**Exercise 4. Write formulas in words:**

$\text{Ca}^{2+}$		$\text{Cl}^-$	
$\text{Sr}^{2+}$		$\text{BaCl}_2$	
$\text{H}_2\text{SO}_4$		KCl	

HNO <sub>3</sub>		MgCl <sub>2</sub>	
HCl		NH <sub>4</sub> NO <sub>3</sub>	
CH <sub>3</sub> COOH		HClO <sub>4</sub>	

**Exercise 5. Read the definitions and choose the proper term given in brackets:**

Chemical bond; gravimetric analysis; indicator; iodimetry; oxidant; polarimetry; precipitate; titrant.

- \_\_\_\_\_ – titration in order to quantitatively analyse iodine in a sample.
- \_\_\_\_\_ – a compound that changes color at a particular pH, or over a particular narrow range of pH, used to show titration end points.
- \_\_\_\_\_ – a chemical agent that oxidizes.
- \_\_\_\_\_ – the reagent of known concentration.
- \_\_\_\_\_ – the connection between two atoms in a molecule.
- \_\_\_\_\_ – a type of quantitative analysis in which the amount of a species in a material is determined by converting the species to a product that can be isolated completely and weighed.
- \_\_\_\_\_ – an insoluble solid compound formed during a chemical reaction in solution.
- \_\_\_\_\_ – measurement of the angle of rotation of the plane of polarized light that results upon its passage through certain transparent materials.

**Exercise 6. Complete the abstract using the words and phrases below.**

Aqueous; dissociation; dynamic; Greek; molecules; organic; percentage; weak.

The degree of dissociation of the electrolyte is the ratio of the number of its \_\_\_\_\_, decomposed in this solution into ions, to the total number of its molecules in solution.

In this regard, electrolytes can be divided into two groups - strong and weak electrolytes. Strong electrolytes in \_\_\_\_\_ solutions are dissociated almost completely. The concept of the degree of \_\_\_\_\_ is not applied to them. \_\_\_\_\_ electrolytes in aqueous solutions dissociate only partially, and a \_\_\_\_\_ equilibrium is established in the solution between undissociated molecules and ions. Strong electrolytes include almost all salts; of acids and bases they include HNO<sub>3</sub>, HClO<sub>4</sub>, HCl, HBr, HI, KOH, NaOH, Ba (OH) 2 and Ca (OH) 2.

Weak electrolytes include most \_\_\_\_\_ acids, and the most important inorganic compounds include H<sub>2</sub>CO<sub>3</sub>, H<sub>2</sub>S, HCN, H<sub>2</sub>SiO<sub>3</sub> NH<sub>4</sub>OH. The degree of dissociation is denoted by the \_\_\_\_\_ letter  $\alpha$  and expressed either in fractions of a unit or as a \_\_\_\_\_.

**4. Підбиття підсумків.**

**5. Список рекомендованої літератури**

**Основна**

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<http://recremisi.blogspot.com/p/online-term-extractors.html>
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<https://www.online-medical-dictionary.org/>

## Практичне заняття № 14

### Тема 6: ORGANIC CHEMISTRY-1

**Мета:** розширення, поглиблення й деталізація наукової термінології з аналітичної хімії, формування мовленнєвих компетентностей, розвиток наукового мислення та усного мовлення здобувачів вищої освіти.

**Основні поняття:** органічна хімія, хімічна реакція, хімічні елементи, органічні і неорганічні хімічні сполуки

#### План:

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What is organic chemistry?

What is organic substance?

**3. Формування професійних вмінь, навичок:** сформувати і закріпити навички пошукового читання та аналізу наукового тексту за темою заняття, закріпити спеціальний вокабуляр.

#### Exercise 1. Key words

*Необхідно звернути увагу здобувачів на морфологічну приналежність термінологічних слів та словотворчі терміноелементи*

NOUN	VERB	ADJECTIVE	ADVERB
ability	allow	antispasmodic	widely
associate	break up	excessive	biologically
bond	convert	explicit	exclusively
bone marrow	exhibit	liquid	nevertheless
chain	explore	planar	
correspond	involve	simple	
disorder	mention	simultaneous	
enzyme	obtain	solid	
ester	participate in	structural	
gout	promote	unsaturated	
heating	result from		
interface	result in		
oxidation			
rearrangement			
reduction			
sodium			
starch			
strength			
substitution			
uric acid			

#### Exercise 1. Read the text.

*Звернути увагу здобувачів на правильне читання хімічних елементів і формул. Відпрацювати вміння виділяти ключові слова тексту.*

#### Alkanes

*Hydrocarbons are called alkanes aliphatic molecules in which carbon atoms are linked by only simple covalent bonds ( $\sigma$ -bonds). Synonyms - limit or saturated hydrocarbons, paraffin.*

The general formula of alkanes –  $C_nH_{2n+2}$ , founder of the homologous series - methane  $CH_4$ . Since  $S_4N_{10}$  hydrocarbons, alkanes can be as non-hardened and branched chain. The first is called normal or n-alkanes. The first four members of the homologous series of alkanes are trivial names - methane, ethane, propane, butane, the names of these hydrocarbons with n carbon chain formed from the Greek. or Latin. numerals (indicate the number of carbon atoms in the molecule) with the addition of the suffix -an, such as pentane, hexane. The names of alkanes branched carbon chain formed according substitution nomenclature IUPAC.

*Structure* Carbon atoms in alkanes are tetrahedral configuration ( $sp^3$ -hybridization) valence angles between the bonds equal  $109^\circ 28'$ . In cases where the carbon atom linked with different rulers multiple angles deviate from tetrahedral. The length of the C-C bond in alkanes 0.154 nm, the C-H - 0.110 nm. According to RSA alkanes n 'structure in the crystalline state with a zigzag conformation most advantageous in energy terms.

*Structural isomerism* alkane (chain isomerism) is possible, starting with butane  $S_4N_{10}$  (isomers - n-butane and isobutane). Since hydrocarbon  $S_7N_{16}$  for alkanes possible *optical isomers*.

*Methods of obtaining* The main natural sources - oil (a complex mixture of organic compounds with a predominance of alkanes) and natural gas (gaseous alkanes, mainly methane (95%), ethane, propane and butane).

Natural gas is separated into bonding components followed by fractional distillation.

*Physical and chemical properties* Under normal conditions, four first member of the homologous series of alkanes - gaseous substances, n-alkanes from  $C_5$  -  $C_{17}$  - fluid  $> C_{17}$  - solids. With increasing M homologous series increases try melting and boiling points, t bp. isomers branched chain lower than that of n-alkanes. All alkanes lighter than water and practically insoluble in it; readily soluble in nonpolar organic solvents ( $(S_2N_5)_2O$ ,  $CCl_4$ , benzene, etc.), and with increasing N solubility decreases.

Under normal conditions, alkanes unreactive resistant to acids, alkalis and oxidants, due to the high strength  $\sigma$ -bonds C-C and C-H. C-C bonds and C-H virtually non-polar and is not prone to rupture heterolytic, but able to homolysis the formation of free radicals, ie alkanes typical substitution reaction taking place on the radical mechanism (SR).

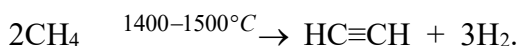
*Halogenation.* For reactivity relative to alkanes halogens are arranged in series:  $F_2 > Cl_2 > Br_2$ . The reaction of fluorine is in the nature of the explosion and rupture accompanied by C-C bonds. Therefore fluorination of alkanes using special techniques (eg, nitrogen dilution of reagents). Less exothermic reaction chlorination, takes place with UV irradiation or heating by free radical mechanism.

*Catalytic oxidation.* Takes place in the presence of catalysts (salts of manganese, chromium, lead, etc.) at  $150 - 200^\circ C$  to form mostly carboxylic acids, aldehydes, ketones and alcohols such:



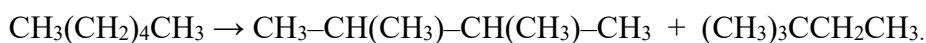
The oxidation is used in industry to produce methanol, formaldehyde, acetaldehyde and acetic acid from propane and butane, as well as fatty acids from alkanes with chain length  $> C_{25}$ .

*Cracking alkanes* There are thermal cracking (at  $t \geq 800^\circ C$ ) and catalytic cracking (at  $t = 450 - 550^\circ C$  in the presence of silica-alumina catalysts), such as:



Higher alkanes in terms of thermal cracking decompose to form a complex mixture of lower alkanes and alkenes; the reaction proceeds by a radical mechanism.

In catalytic cracking (flowing through ion mechanism) cleavage of C-C bonds usually accompanied by isomerization of n-alkanes to branched chain alkanes:



Cracking process is of great commercial importance and is widely used to produce high-octane gasoline, unsaturated and aromatic hydrocarbons.

### Exercise 3. Answer the questions

Надати можливість здобувачам оцінити правильність відповідей на питання їхніх колег

1. What are alkanes?
2. Name four members of the homologous series.
3. What are physical and chemical properties?
4. Oxidation is used in industry to produce what?
5. What is used to produce high-octane gasoline, unsaturated and aromatic hydrocarbons.
6. What are examples of catalysts?
7. How the natural gas is separated?
8. What is the general formula of alkanes?

### Exercise 4. Match the words to make word combinations

catalytic	importance
commercial	series
produce	distillation
normal	configuration
fractional	methanol
homologous	cracking
tetrahedral	mixture
complex	conditions

### Exercise 5. Fill in the text to make definitions.

**Organic chemistry** is a branch of chemistry that studies the structure, properties and reactions of organic \_\_\_\_\_, which contain carbon-carbon covalent bonds. Study of structure determines their structural formula. Study of properties \_\_\_\_\_ physical and chemical\_\_\_\_\_, and evaluation of chemical reactivity to understand their behavior. The study of organic reactions includes the chemical \_\_\_\_ of natural products, drugs, and polymers, and study of individual organic \_\_\_\_\_ in the laboratory and via theoretical (in silico) study.

In organic chemistry, an **alkane**, or paraffin (a historical trivial name that also has other meanings), is an acyclic saturated\_\_\_\_\_. In other words, an alkane consists of \_\_\_\_\_ and carbon atoms \_\_\_\_\_ in a tree structure in which all the carbon-carbon \_\_\_\_\_ are single. Alkanes have the general chemical formula

**Carbon** (from Latin: carbo "coal") is a chemical element with the symbol C and atomic number 6. It is nonmetallic and tetravalent—its atom making four \_\_\_\_\_ available to form covalent chemical bonds. It belongs to group 14 of the periodic table. Carbon makes up only about 0.025 percent of Earth's crust. Three \_\_\_\_\_ occur naturally, <sup>12</sup>C and <sup>13</sup>C being stable, while <sup>14</sup>C is a radionuclide, decaying with a half-life of about 5,730 years. Carbon is one of the few \_\_\_\_\_ known since antiquity.

Includes, arranged, synthesis, molecules, elements, electrons, properties, compounds, hydrogen, hydrocarbon, bonds, isotopes

**Exercise 6. Find synonyms in the texts (ex2 and ex5)**

natural	
breaking, fracturing	
backdrop setting	
outspread, split	
chain	
inflexibly	
considerable	
complete, regulate	
brusque	
medicine, remedy	

**Exercise 7. Make your sentences in Active and Passive Voice forms.**

Methane	
Reactivity	
Periodic table	
Natural products	
Oxidation	
Conditions	
Cracking	
Founder	
Available	
Synthesis	
Hydrogen	

**4. Підбиття підсумків.**

**5. Список рекомендованої літератури**

**Основна**

1. ENGLISH FOR PROFESSIONAL PURPOSES. PHARMACY: Course book for 3rd year students of the Faculty of Pharmacy. – Одеса: ОНМедУ, 2023. – 196 с. (комп'ютерна верстка)
2. Збірник вправ по роботі з греко-латинськими елементами в англійській медичній термінології. - Одеса: ОНМедУ, 2023. – 20 с. (комп'ютерна верстка)  
<https://info.odmu.edu.ua/chair/philosophy/fileinfo/816/183375>
3. Professional Medical English: Course book for higher education students, speciality 222 Medicine of higher educational institutions of IV level of accreditation / Rusalkina, L. H.; Mokriienko, E. M.; Lazor, N. V.; Bermas, O. M. - Odesa: ONMedU, 2023. - 256 с.

**Додаткова:**

1. Medical English for Academic Purposes, Ю.В. Лисанець, О.М.Беляєва, М.П. Мелашенко 2018, Видавництво Медицина. - 312 с.
2. Lippincott Illustrated Reviews: Pharmacology, Автор Karen Whalen Видавництво Lippincott Williams & Wilkins, 2018. - 576 с.
3. Medical Terminology. An Illustrated Guide. Barbara Janson Cohen, Shirley A.Jones. Ninth Edition. Jones and Bartlett Learning, 2021, - 670 p.
4. Raymond Murphy. English Grammar in Use. Cambridge University Press, 2019. – 380 p.

5. Sabluk A. H., Levandovska L.V. English for medical students. – BCB Medicine 2018. - 576 p.

**Електронні інформаційні ресурси:**

1. Одеський національний медичний університет: <https://onmedu.edu.ua/>
2. Інформаційні матеріали: <http://www.info.odmu.edu.ua>
  
3. Webster's Dictionary and Thesaurus  
<https://www.merriam-webster.com/>
4. Longman Dictionary of Contemporary English  
<https://www.ldoceonline.com/>
5. The International Medical Interpreters Association  
<https://www.imiaweb.org/>
6. Free Online Term Extractors  
<http://recremisi.blogspot.com/p/online-term-extractors.html>
7. Medical Dictionary Online  
<https://www.online-medical-dictionary.org/>

## Практичне заняття № 15

### Тема 6: ORGANIC CHEMISTRY-2

**Мета:** розширення, поглиблення й деталізація наукової термінології з аналітичної хімії, формування мовленнєвих компетентностей, розвиток наукового мислення та усного мовлення здобувачів вищої освіти.

**Основні поняття:** органічна хімія, хімічна реакція, хімічні елементи, органічні і неорганічні хімічні сполуки

#### План:

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What are alkalines?

What is organic substance?

**3. Формування професійних вмінь, навичок:** сформувати і закріпити навички пошукового читання та аналізу наукового тексту за темою заняття, закріпити спеціальний вокабуляр.

#### Exercise 1. Key words

*Необхідно звернути увагу здобувачів на морфологічну приналежність термінологічних слів та словотворчі терміноелементи*

NOUN	VERB	ADJECTIVE	ADVERB
appearance	administer	acute	daily
appointment		crimson	eventually
complaint	consume	cyanotic	mainly
condition		diluted	radially
development		external	sharply
exertion		intraocular	
	determine	low	
feature	disrupt		
infiltration	equal	respiratory	
inflorescence		saponated	
inoculation		secretory	
interaction	sell	severe	
lavage		subsequent	
		thick	
pregnancy		thin	
pressure		thready	
research		virological	
solution			
suppression			

#### Exercise 2. Translate the tests.

**1.** Calculation of chemical reactions thermal effects at pharmaceutical production is based on the Hess law, stating that reaction thermal effect is determined by:

- A. Initial and final state of system
  - B. Mechanism by which the chemical change occurs
  - C. Route by which the chemical change occurs
  - D. Number of intermediate stages
  - E. Process duration
2. Dobutamine has been administered to the 49-year-old-patient with acute cardiac failure and cardiac glycoside intolerance. What is this drug's mechanism of action?
- A. Stimulation of  $\beta_1$ -adrenoreceptors
  - B. Stimulation of  $\alpha_1$ -adrenoreceptors
  - C. Blockade of  $K^+$ -,  $Na^+$ - adenosinetrip hosphatase
  - D. Suppression of phosphodiesterase activity
  - E. Stimulation of *M*-cholinergic receptors
3. During calculous cholecystitis attack the patient has developed the following symptoms: saponated feces and steatorrhea. What stage of fats metabolism is disrupted according to those symptoms?
- A. Fat digestion, absorption and secretion
  - B. Fat absorption
  - C. Intermediary metabolism of fats
  - D. Fats metabolism in adipose tissue
  - E. Depositing disruption
4. If aromatic secretory-downy plant has square in cross section stem, spike inflorescence made up from whorled dichasia, bilabiate corolla and its fruit consists of four nutlets, it probably belongs to the following family:
- A. *Lamiaceae*
  - B. *Scrofulariaceae*
  - C. *Brassicaceae*
  - D. *Apiaceae*
  - E. *Solanaceae*
5. When root is studied under microscope, one leading bundle is detected in its maturation zone, where xylem and phloem areas interchange radially. It can be concluded that this bundle type is:
- A. Radial
  - B. Collateral
  - C. Bicollateral
  - D. Amphicribal
  - E. Amphivasal
6. In large intestine microorganisms synthesize vitamins that participate in organism's biochemical processes. What vitamins are mainly synthesized by microflora?
- A. *K, B<sub>12</sub>*
  - B. *A, C*
  - C. *E, PP*
  - D. *B<sub>1</sub>, B<sub>2</sub>*
  - E. *B<sub>6</sub>, E*

7. Parents of the 10-year-old child have made an appointment with an endocrinologist due to complaints of the child's low height. The child's appearance is corresponding with that of a 5-year-old child. What hormone secretion disorder causes such physical development changes?

- A. Somatotrophic hormone
- B. Adrenocorticotrophic hormone
- C. Thyroxin
- D. Testosterone
- E. Insulin

8. The 55-year-old patient has been hospitalized due to chronic cardiac failure. Objectively: skin and mucosa are cyanotic, tachycardia, tachypnea. What kind of hypoxia does the patient have?

- A. Circulatory
- B. Anemic
- C. Hemic
- D. Tissue
- E. Hypoxic

9. The patient has been hospitalized with pneumonia. What kind of respiratory failure does the patient have?

- A. Restrictive
- B. Obstructive
- C. Central
- D. Peripheral
- E. Thoracic diaphragm

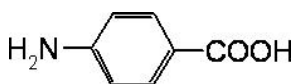
10. What are the indications for naloxone?

- A. Narcotic analgetics acute poisoning
- B. Heavy metals poisoning
- C. Cardiac glycosides poisoning
- D. Ergot alkaloids poisoning
- E. Atropine sulphate poisoning

11. During gastric secretory function research, a decrease of hydrochloric acid concentration in gastric juice was detected. What enzyme will be less active in such a condition?

- A. Pepsin
- B. Amylase
- C. Lipase
- D. Dipeptidase
- E. Hexokinase

12. What reagent does the p-aminobenzoic acid amino group react with?



- A. HCl
- B. NH<sub>4</sub>OH

- C.  $\text{NaOH}$
- D.  $\text{CH}_3\text{COONa}$
- E.  $\text{KCN}$

13. The patient with hepatic colic has been prescribed spasmolytic of muscarinic receptor antagonists group as a part of his complex therapy. What drug is it?

- A. Atropine
- B. Proserin
- C. Galantamine
- D. Dithylin
- E. Benzohexonium

14. In the course of plant cells treatment with phloroglucinol with concentrated sulfuric acid their cell walls became crimson-red, which means:

- A. Lignification
- B. Suberization
- C. Mucification
- D. Cutinization
- E. Mineralization

**Exercise 6. Put questions to sentences below**

1. In the large intestine, microorganisms synthesize vitamins that participate in the body's biochemical processes.
2. Epinephrine is used to prolong the effect of novocaine during anesthesia.
3. Natural peptides can perform various functions.
4. Hormone-like compounds are used to stimulate childbirth and for contraception.
5. Tetanic spasms of skeletal muscles occur with a low concentration of calcium in the blood.
6. The child's parents made an appointment with an endocrinologist because of complaints about the child's short stature.
7. A certain staining method is used to identify capsular bacteria.
8. The patient was brought to the hospital with iron deficiency anemia.
9. The student analyzes the plant organ that provides nutrition, vegetative reproduction and anchoring of plants in the soil.
10. Students should point out the features of oxidation.

**Exercise 4. Find the synonyms from the tests.**

- Stone -
- contraction, shortening -
- obstruction -
- cardiac failure -
- discharge, eliminate -
- state -
- aim -
- delivery -
- specimen -
- feature -

**Exercise 5. Fill in the table.**

NOUN	VERB	ADJECTIVE
immunity		
		definite
	exert	
indicator		
	contain	
		treated
action		
		dividable
	dilute	
infection		

**Exercise 6. Match the terms with their definitions.**

1. Reduction	j) is a chemical reaction in which two molecules come together to make a bigger one.
2. Addition	k) is a process that leads to the chemical transformation of one set of chemical substances to another.
3. Hydroliss	l) is a chemical reaction that involves the gaining of electrons by one of the atoms involved in the reaction between two chemicals.
4. Chemical reaction	m) is a chemical reaction that involves the loss of electrons.
5. Chemical bond	n) is a chemical reaction in which one group replaces the other.
6. Rearrangement	o) is any chemical reaction in which a molecule of water ruptures one or more chemical bonds.
7. Oxidation	p) is a chemical reaction in which an atom or group migrates from one carbon atom to another.
8. Substitution	q) is a lasting attraction between atoms, ions or molecules that enables the formation of chemical compounds.

**4. Підбиття підсумків.**

**5. Список рекомендованої літератури**

**Основна**

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<https://info.odmu.edu.ua/chair/philosophy/fileinfo/816/183375>
3. Professional Medical English: Course book for higher education students, speciality 222 Medicine of higher educational institutions of IV level of accreditation / Rusalkina, L. H.; Mokriienko, E. M.; Lazor, N. V.; Bermas, O. M. - Odesa: ONMedU, 2023. - 256 с.

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5. Sabluk A. H., Levandovska L.V. English for medical students. – BCB Medicine 2018. - 576 p.

**Електронні інформаційні ресурси:**

1. Одеський національний медичний університет: <https://onmedu.edu.ua/>
2. Інформаційні матеріали: <http://www.info.odmu.edu.ua>
  
3. Webster's Dictionary and Thesaurus  
<https://www.merriam-webster.com/>
4. Longman Dictionary of Contemporary English  
<https://www.ldoceonline.com/>
5. The International Medical Interpreters Association  
<https://www.imiaweb.org/>
6. Free Online Term Extractors  
<http://recremisi.blogspot.com/p/online-term-extractors.html>
7. Medical Dictionary Online  
<https://www.online-medical-dictionary.org/>

## Практичне заняття № 16

### Тема 7: PHYSICAL AND COLLOIDAL CHEMISTRY -1

**Мета:** розширення, поглиблення й деталізація наукової термінології з аналітичної хімії, формування мовленнєвих компетентностей, розвиток наукового мислення та усного мовлення здобувачів вищої освіти.

**Основні поняття:** аналітична хімія, хімічна реакція, хімічні елементи, хімічні сполуки

#### План:

1. **Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

2. **Контроль опорного рівня знань.**

What does physical and colloidal chemistry deal with ?

What are the methods of physical and colloidal chemistry?

3. **Формування професійних вмінь, навичок:** сформулювати і закріпити навички пошукового читання та аналізу наукового тексту за темою заняття, закріпити спеціальний вокабуляр.

#### Exercise 1. Active Vocabulary

Noun	Verb	Adjective	Adverb
amount	belong to	concerted	extremely
calculation	differ	dispensing	freshly
constant	equal	disperse	numerically
degree	extract	high	towards
duration	refine	initial	widely
production	state	mutual	
rate	treat	rare	
route		thermal	
scattering			
solvent			
stage			
wetting			

#### Exercise 2. Read the tests:

1. Calculation of chemical reactions thermal effects at pharmaceutical production is based on the Hess law, stating that reaction thermal effect is determined by:

- A. Initial and final state of system
- B. Mechanism by which the chemical change occurs
- C. Route by which the chemical change occurs
- D. Number of intermediate stages
- E. Process duration

2. Research of reaction rate dependence on various factors allows intensification of technological processes. What factor **HAS NO** effect on the reaction rate constant?

- A. Reacting agents concentration
- B. Temperature
- C. Reagents nature
- D. Solvent nature
- E. Solid substance dispersion degree

3. Potentiometric method of pH measuring is used during pharmaceutical substances research. What electrode can be used as indicator (working electrode) in solution pH measuring?  
A. Glass B. Standard hydrogen C. Zinc D. Calomel E. Silver-chlorine
4. Water solution of  $\text{CaCl}_2$  with 10% mass concentration is used for intravenous injections. What is the maximum value of  $\text{CaCl}_2$  isotonic coefficient in water solution?  
A. 3 B. 4 C. 2 D. 5 E. 1
5. Pharmaceutical synthesis requires studying complex reaction kinetics. If the first stage product is the second stage initial substance, then such reaction is called:  
A. Consecutive B. Inverse C. Concerted D. Second order E. Parallel
6. Reaction rate constant numerically equals the reaction rate, if molar concentrations of:  
A. All reagents equal to 1 B. Reagents differ by 1 C. Products are identical  
D. Products differ by 1 E. -
7. In potentiometric titration the following indicator electrode is used for chloride and borate acids quantitative determination in their mixture:  
A. Glass B. Silver-chlorine C. Silver D. Platinum E. Calomel
8. In pharmaceutical production oxyethylated derivatives of fatty acid esters (FAEs) are used. They undergo colloid dissolution in sufficiently concentrated solutions. This process is called:  
A. Solubilization B. Sensitization C. Synergism D. Colloid protection E. Syneresis
9. The dispensing chemist has been studying properties of certain disperse system classes, namely, aerosols. What optical phenomenon is characteristic of this disperse system class?  
A. Light scattering B. Light absorption C. Opalescence D. Light reflection E. Light refraction
10. Selective solvents are used in laboratories and factories to isolate and refine essential oils, alkaloids, antibiotics and other pharmaceutical substances. This process is called:  
A. Extraction B. Sedimentation C. Coagulation D. Flocculation E. Flotation
11. When liquid dosage forms are produced, colloid surfactants are added to increase certain components solubility. What physicochemical phenomenon is this process based on?  
A. Solubilization B. Coagulation C. Extraction D. Diffusion E. Sedimentation
12. A pharmacist has been adding several small portions of electrolyte to silver chloride sol, which resulted in coagulation occurring at a higher electrolyte concentration than that occurring at adding same electrolyte by a single portion. This phenomenon is called:  
A. Sol acclimatization B. Antagonism C. Synergism D. Additivity E. Desensitization
13. If an amount of high-molecular substance added to the given sol is extremely small, it is possible that its stability decreases instead of increase. What is this phenomenon called?  
A. Sensitization B. Solubilization C. Syneresis D. Sedimentation E. Synergism
14. A method of removal of low-molecular impurities from the colloidal systems and high-molecular compound solutions by the diffusion through semi-permeable membrane is called:  
A. Dialysis B. Electrodialysis C. Ultrafiltration D. Decantation E. Compensatory dialysis
15. Which aqueous solutions of the drugs having same molarity will be characterized by the highest boiling temperature:  
A. Sodium sulfate B. Promedol (Trimeperidine) C. Nicotinamide D. Resorcin E. Iodine

**Exercise 3. Find synonyms of the following words in the tests:**

influence		increase in size	
transform		need	
to experience something		purify	
be a part of		get	
Happen		remove	

**Exercise 4. Fill the table with the missing parts of speech:**

Noun	Verb	Adjective
Extraction		
Reduction		
Research		
Solvent		
Wetting		
Removal		
protection		
Point		

**Exercise 5. Read the definitions and choose the proper term given in brackets:**

Coagulation; colloid; dialysis; flocculation; potentiometric titration; *reaction rate*; surfactant; syneresis.

- \_\_\_\_\_ – the speed at which reactants are converted into products in a chemical reaction.
- \_\_\_\_\_ – a surface-active substance, such as a detergent or soap, that lowers the surface tension of a solvent (usually water).
- \_\_\_\_\_ – the clumping of particles in order to settle out impurities; often induced by chemicals such as lime or alum.
- \_\_\_\_\_ – the process of separating suspended solids from wastewater by chemical creation of a coagulated or flocculent masses.
- \_\_\_\_\_ is a phase separated mixture in which one substance of microscopically dispersed insoluble or soluble particles is suspended throughout another substance.
- \_\_\_\_\_ is a volumetric method in which the potential between two electrodes is measured (referent and indicator electrode) as a function of the added reagent volume.
- \_\_\_\_\_ is the process of separating molecules in solution by the difference in their rates of diffusion through a semipermeable membrane.
- \_\_\_\_\_ – the contraction of a gel accompanied by the exudation of liquid.

**Exercise 6. Complete the abstract using the words and phrases below.**

Colloidal; gel; mechanical; network; physically; polymer; precipitates; solvated .

\_\_\_\_\_ particles are usually \_\_\_\_\_, often to the extent of about one molecular layer, and this tightly bound solvent must be treated as a part of the particle. Sometimes much greater amounts of solvent can be immobilised by \_\_\_\_\_ entrapment within particle aggregates. This occurs when voluminous flocculent hydroxide \_\_\_\_\_ are formed. In solutions of long thread-like molecules the \_\_\_\_\_ chains may cross-link, chemically or \_\_\_\_\_, and/or become mechanically entangled to such an extent that a continuous three-dimensional network is formed. If all of the solvent becomes mechanically trapped and

immobilised within this \_\_\_\_\_, the system as a whole takes on a solid appearance and is called a \_\_\_\_\_.

#### 4. Підбиття підсумків.

#### 5. Список рекомендованої літератури

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<https://www.imiaweb.org/>
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## Практичне заняття № 17

### Тема 7: PHYSICAL AND COLLOIDAL CHEMISTRY -2

**Мета:** розширення, поглиблення й деталізація наукової термінології з аналітичної хімії, формування мовленнєвих компетентностей, розвиток наукового мислення та усного мовлення здобувачів вищої освіти.

**Основні поняття:** аналітична хімія, хімічна реакція, хімічні елементи, хімічні сполуки

#### План:

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What does physical and colloidal chemistry deal with ?

What are the methods of physical and colloidal chemistry?

**3. Формування професійних вмінь, навичок:** сформуванати і закріпити навички пошукового читання та аналізу наукового тексту за темою заняття, закріпити спеціальний вокабуляр.

#### Exercise 1. Active Vocabulary

Noun	Verb	Adjective	Adverb
composition	assess	auxiliary	among
curve	build	coarse	positively
droplet	introduce	colourless	
interaction		cooling	
maldigestion		necessary	
parchment		osmotic	
purity		semipermeable	
response			
rotation			
surfactant			
venom			
volume			

#### Exercise 2. Read and translate the tests:

1. Choose the colloid surfactant among the substances listed below:

A. Polyethylene

B. Iodine

C. Sodium chloride

D. Gelatin

E. Potassium oleate

2. In snake venom there is a substance that causes erythrocyte hemolysis when it is introduced into a human organism. Blood test revealed a large amount of lysolecithin (lysophosphatidylcholine). What enzyme leads to accumulating lysolecithin in blood?

A. Phospholipase A2 B. Phospholipase A1 C. Phospholipase C D. Phospholipase D

E. Neuraminidase

3. Suspension is a form of pharmaceuticals used in medical practice. Which pair of substances is able to form suspension?

- A. Ethanol-diethyl ether
- B. Water-oil
- C. Ethanol-ethyl acetate
- D. Water-clay
- E. Water-ethanol

4. Structure of proteins includes proteinogenic amino acids. What is the position of the amino group in the structure of these amino acids?

- A.  $\alpha$ -position
- B.  $\beta$ -position
- C.  $\gamma$ -position
- D.  $\delta$ -position
- E. -position

5. Osmotic pressure is an important characteristic of biological fluids. Semipermeable membranes are necessary for penetration of solvent molecules. What substance **CANNOT** be used as a semi-permeable membrane?

- A. Parchment
- B. Biological membrane
- C. Collodion film
- D. Gelatine
- E. Glass

6. Thermal analysis is used in pharmacy to identify drugs and determine drug purity. What coordinates are necessary to build a cooling curve?

- A. Volume-temperature
- B. Pressure-time
- C. Temperature-volume
- D. Temperature-time
- E. Volume-time

7. In the qualitative analysis which involves precipitation of sulphates of the third analytical group cations ( $Ca^{2+}$ ,  $Sr^{2+}$ ,  $Ba^{2+}$ ) the solubility of sulphates can be reduced by adding:

- A. Ethyl alcohol
- B. Distilled water
- C. Benzene
- D. Chloroform
- E. Amyl alcohol

8. Optical activity of monosaccharides can be explained by their:

- A. Asymmetric carbon atoms in a molecule
- B. Asymmetric crystal
- C. Complicated rotation around  $\sigma$ -bond
- D. Aldehyde or ketone group
- E. Number of hydroxyl groups in a molecule

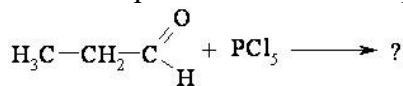
9. In terms of water-air interface, the following substance acts as a surface-active substance:

- A. Valeric acid
- B.  $HCl$
- C.  $NaOH$
- D. Urea
- E. -

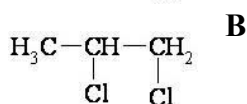
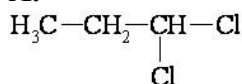
10. Given the ability of iodine to dissolve in non-polar solvents, determine the type of chemical bond in an  $I_2$  molecule:

- A. Nonpolar covalent
- B. Ionic
- C. Polar covalent
- D. Metal
- E. Intermolecular interaction

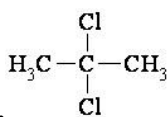
11. What product results from propionic aldehyde and  $PCl_5$  interaction?



A.

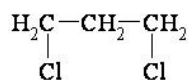


B

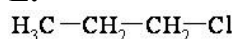


. C.

D.



E.



12. During assessment of air purity in an aseptic unit of a pharmacy, sedimentation analysis had been applied. Test resulted in growth of the small colonies with areas of hemolysis. What medium was used for inoculation?

- A. Blood agar
- B. Levine's formulation (Eosin Methylene Blue agar)
- C. Endo agar
- D. Ploskirev's agar
- E. Egg-yolk salt agar

13. What enzyme allows for synthesis of various genes from template-RNA to DNA in genetic engineering (this enzyme catalyzes the process detected in RNA-viruses)?

- A. Reverse transcriptase
- B. Exonuclease
- C. DNA-ligase
- D. Helicase
- E. Endonuclease

14. According to van't Hoff rule, when the temperature is raised by 10 degrees, the reaction rate increases by:

- A. 2-4 times
- B. 1,5 times
- C. 5 times
- D. 10 times
- E. Temperature does not affect reaction rate

15. Specify the precipitating agent to be used in gravimetric determination of calcium salts:

- A.  $(NH_4)_2C_2O_4$
- B.  $K_2C_2O_4$
- C.  $Na_2C_2O_4$
- D.  $Na_2CO_3$   
 $K_2CO_3$

**Exercise 3. Find synonyms of the following words in the tests:**

Lack		Important	
environment		Coloured	
evaluation		Answer	
additional		lead to	
stomach		identification	

**Exercise 4. Form Adjectives using the Nouns and Verbs given below.**

Essence		allergy	
hyperemia		symmetry	
development		botany	
bacteria		provision	
Specify		culture	

**Exercise 5. Read the definitions and choose the proper term given in brackets:**

Chromatography; extraction; inoculation; monosaccharide; nutrient medium; ph scale; polynucleotide; sedimentation.

- \_\_\_\_\_ – a substance, either solid or liquid, used for the cultivation, isolation, identification, or storage of microorganisms.
- \_\_\_\_\_ – a biopolymer comprised of a long, linear series of nucleotides joined together by ester linkages between the phosphoryl group of nucleotide and the hydroxyl group of the sugar component of the next nucleotide.
- \_\_\_\_\_ – the act of introducing microorganism or suspension of microorganisms (e.g. bacteria) into a culture medium.
- \_\_\_\_\_ – the range of values from 0 to 14 that describes the acidity or basicity of a solution.
- \_\_\_\_\_ is a separation process consisting in the separation of a substance from a matrix.
- \_\_\_\_\_ – technique of separating molecules or components in a mixture according to the differential absorption and elution.
- \_\_\_\_\_ – the deposition of suspended matter carried by water, wastewater, or other liquids, by gravity.
- \_\_\_\_\_ – a carbohydrate that does not hydrolyze, as glucose, fructose, or ribose, occurring naturally or obtained by the hydrolysis of glycosides or polysaccharides.

**Exercise 6. Complete the abstract using the words and phrases below.**

Average; colloidal; molecular; molecules; monodispersed; particle; polydispersed; relative.

The terms *relative* \_\_\_\_\_ *mass* and *particle size* can only have well-defined meanings when the system under consideration is \_\_\_\_\_ - i.e. when the molecules or particles are all alike. \_\_\_\_\_ systems are generally of a \_\_\_\_\_ nature - i.e. the molecules or particles in a particular sample vary in size. By virtue of their stepwise build-up,

colloidal particle and polymer molecular sizes tend to have skew distributions, as illustrated in Figure 1.2, for which the Poisson distribution often offers a good approximation. Very often, detailed determination of \_\_\_\_\_ molecular mass or \_\_\_\_\_ size distribution is impracticable and less perfect experimental methods, which yield average values, must be accepted. The significance of the word \_\_\_\_\_ depends on the relative contributions of the various \_\_\_\_\_ or particles to the property of the system which is being measured.

#### 4. Підбиття підсумків.

#### 5. Список рекомендованої літератури

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## Практичне заняття № 18

### Тема: MICROBIOLOGY. PART I.

**Мета:** ознайомити здобувачів вищої освіти з медичними термінами, що стосуються мікробіології: їх переклад, особливості словотворення, аналіз елементів греко-латинського походження; визначення холери, критичний аналіз її етіології, патогенезу, діагностики, лікування та заходів з запобігання ускладнень англійською мовою.

**Основні поняття:** мікробіологія, холера.

#### План

1. **Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

2. **Контроль опорного рівня знань.**

What is Microbiology? What does it study?

What types of pathogens do you know?

3. **Формування професійних вмінь, навичок:**

**Exercise 1. Find in the text English equivalents to the following Ukrainian words and word-combinations:**

патогенний вид; взаємодія між хазяїном і патогеном; бінарний поперечний поділ; внутрішньоклітинні паразити; грибкові інфекції; плоскі, стрічкові і круглі черви; найпростіші, що передаються членистоногими; проказа і чума; губчастоподібна енцефалопатія великої рогатої худоби (коров'ячий сказ); пріонна інфекція овець; трансмісивна губчаста/спонгіформна енцефалопатія; нестатеве і статеве розмноження; хвороботворні властивості популяції (штаму) патогенного виду, причинно-наслідковий зв'язок між бактеріями і клінічним захворюванням

**Exercise 2. Match the terms to their definitions:**

4. Fermentation	5. is a taxonomic category ranking used in biological classification that is below family and above species
5. Bacillus	6. is a relatively rare bacterial infection that affects people and animals. It can pass from animals to humans when an unhealed break in the skin comes in contact with water or soil where animal urine is present.
6. Agar	7. is the process in which a substance breaks down into a simpler substance. Microorganisms like yeast and bacteria usually play a role in this process.
7. Leptospirosis	8. is a specialized defense protein synthesized by the vertebrate immune system.
8. Genus	9. is any of a genus of rod-shaped gram-positive usually aerobic bacteria producing endospores and including many saprophytes and

	some parasites.
<b>9. Antibody</b>	<b>10.</b> is a dried hydrophilic, colloidal substance extracted from various species of red algae. It is used in cultures for bacteria and other microorganisms, in making emulsions, and as a supporting medium in procedures such as immunodiffusion and electrophoresis.
<b>10.Chancere</b>	<b>11.</b> potentially life-threatening invasion of the bloodstream by pathogenic agents and especially bacteria along with their toxins from a localized infection (as of the lungs or skin) that is accompanied by acute systemic illness.
<b>11.Septicemia</b>	<b>12.</b> is the first sign of syphilis; it is a small, painless sore. It can appear on the sexual organs, rectum, or inside the mouth.

**Exercise 3. Read the text below. Use the word given in brackets to form a word that fits in the gap:**

“Virulence” is a \_\_\_\_\_ (quantity) measure of the pathogenicity of a micro-organism that may be \_\_\_\_\_ (expression) by the ratio of the number of individuals developing clinical \_\_\_\_\_ (ill) to the number of individuals exposed to the micro-organism, or in a \_\_\_\_\_ (compare) manner, by the number of individuals that develop clinical illness if the same dose of different microorganisms is \_\_\_\_\_ (application) to each of them.

\_\_\_\_\_ (pathogen) bacteria have evolved a number of \_\_\_\_\_ (difference) mechanisms, which result in disease in the host. The virulence factors and determinants used by bacteria to \_\_\_\_\_ (interaction) with the host can be unique to specific pathogens or conserved across several different species or even genera. For instance, \_\_\_\_\_ (commonly) mechanisms for \_\_\_\_\_ (adhere), invasion, evasion of host \_\_\_\_\_ (defend) and damage to host cells are shared by profoundly different microbial pathogens.

**Exercise 4. Find misused words and replace them with correct ones (form a word that fits suitably). Explain your choice.**

Covid-19 patients who recovery from the disease still have robust immune from the coronavirus eight months after infection, according to a new study. The result is an encouraging sign that the authors interpret to mean immunity to the viral probably lasts for many years, and it should alleviate fearful that the covid-19 vaccine would require repeated booster shots to protective against the disease and final get the pandemic under control.

“There was a lot of concerned originally that this virus might not induce much memory,” says Shane Crotty, a research at the La Jolla Institute for Immunology in California and a co-author of the new paper. “Instead, the immune memory looks quite good.”

The study, published January 6 in Science, contrasts with earlier findings that suggestion covid-19 immunity could be short-lived, putting millions who’ve already recovered at risk of reinfected. That predicament wouldn’t have been a totally surprise, since infection by other coronaviruses generates antibodies that fade fairly quick. But the new study suggests reinfection should only be a problem for a very small percentage of people who’ve development immunity—whether through an initial infection or by vaccination.

In fact, the new study does show that a small number of recovered people do not have long-lasting immunize. But vaccinate ought to offset that problem by ensuring herd immunity in the larger population.

#### **Exercise 5. Answer the questions.**

1. What kinds of subcellular infectious entities are there?
2. What group of diseases can prions cause?
3. What does the abbreviation *TSE* mean?
4. What are viruses characterized by?
5. How do eukaryotes and prokaryotes differ in their nuclear structure?
6. What is the difference between the cytoplasm of eukaryotes and that of prokaryotes?
7. How do eukaryotes and prokaryotes reproduce?
8. What are the main groups of bacteria?
9. What are *Classic bacteria* characterized by?
10. What is *Chlamydia* characterized by?
11. What is *Rickettsia* characterized by?
12. What are *Mycoplasmas* characterized by?
13. Which microorganisms have no photosynthetic pigments and are carbon heterotrophic?
14. What are the morphological features of *Protozoa*?
15. What human pathogens belong to the animal kingdom?
16. Which types of helminths are medically significant?
17. What does host non-specific defence mechanism include?
18. What are specific immune responses based on?
19. What do *pathogenicity* and *virulence* mean?

#### **4. Підбиття підсумків.**

#### **5. Список рекомендованої літератури**

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## Практичне заняття № 19

### Тема: MICROBIOLOGY. PART II.

**Мета:** ознайомити здобувачів вищої освіти з медичними термінами, що стосуються мікробіології та клінічними кейсами: їх переклад, особливості словотворення, аналіз елементів греко-латинського походження.

**Основні поняття:** мікробіологія, інфекційні захворювання.

### План

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What are the main ways of infectious diseases transmission?

Name the main types of microbiological tests.

**3. Формування професійних вмінь, навичок:**

#### Exercise 1. Read and translate the tests.

1. From the faeces of a patient with acute gastroenteritis a pure culture of microorganisms was obtained. The microorganisms are small mobile slightly curved gram-negative bacilli that within 6 hours grow into a light blue film on the 1% alkaline peptone water. Such properties are characteristic of the following microorganism:

A Vibrio

B Spirochete

C Clostridium

D Bacillus

E Spirillum

2. A patient was brought into the infectious diseases hospital on the 8th day after the disease onset. The patient complains of headache, malaise, and weakness. A sample of blood was taken for the serological test. Widal agglutination test results with blood sample diluted 1:200 and typhoid fever O-diagnosticum were positive. What diagnosis can be made based on the results of this test?

A Typhoid fever

B Dysentery

C Cholera

D Leptospirosis

E Tuberculosis

3. A patient presented with indigestion, stomach-aches, and excessive salivation. Similar symptoms had already been observed in this patient previously. Laboratory analysis detected oval eggs covered with lumpy capsules in the patient's faeces. What is the most likely cause of the patient's disorder?

A Ascariasis

B Trichocephaliasis

C Diphyllbothriasis

D Enterobiasis

E Fascioliasis

4. A medical student was hospitalized into the infectious diseases unit on the 2nd day after the disease onset; the patient is suspected to have infectious mononucleosis. What results of laboratory analysis can confirm this diagnosis immediately on the day of the hospitalization?
- A IgM antibodies to Epstein-Barr virus were detected
  - B IgM antibodies to herpes simplex virus were detected
  - C Fourfold increase in number of antibodies to Epstein-Barr virus was detected
  - D Herpes virus was isolated
  - E Cytomegalovirus antibodies were detected
5. A 40-year-old man developed skin redness and swelling in the neck area, where eventually a small abscess appeared. On section the focus is dense and yellow-green colored. In the purulent masses there are white granules. Histologically there are fungal druses, plasma and xanthoma cells, and macrophages detected. Specify the most correct etiological name of this pathological process:
- A Actinomycosis
  - B Furuncle
  - C Carbuncle
  - D Syphilis
  - E Leprosy
6. A toxin neutralized with 0.4% formaldehyde under 37-40°C for 4 weeks is used for vaccination. This preparation was first used by Gaston Ramon for diphtheria prevention. Name this preparation:
- A Anatoxin
  - B Immunoglobulin
  - C Antitoxic serum
  - D Adjuvant
  - E Inactivated vaccine
7. It is planned to use the territory of an old cattle burial ground (which is not used for more than 50 years) for building houses. But ground analysis revealed presence of the pathogen of the very dangerous illness. Which of the indicated microorganisms is likely to remain in the ground for such a long time?
- A *Bacillus anthracis*
  - B *Mycobacterium bovis*
  - C *Brucella abortus*
  - D *Francisella tularensis*
  - E *Yersinia pestis*
8. Sanitary bacteriological research on water by the membrane filter method revealed two red colonies on a membrane filter (Endo agar) through which 500 ml of analysed water were passed. Calculate the coli index and coli titer of the analysed water:
- A 4 and 250
  - B 2 and 500
  - C 500 and 2
  - D 250 and 2
  - E 250 and 4
9. While examining a patient an otolaryngologist noticed hyperaemia and significantly oedematous tonsils with a greyish film upon them. Microscopical examination of this film revealed some gram-positive bacilli placed at an angle with each other. What disease might be suspected?
- A Diphtheria
  - B Meningococcal nasopharyngitis
  - C Epidemic parotitis
  - D Angina
  - E Scarlet fever

- 10.** A man who was bitten by the unknown dog applied to the surgeon. Wide ragged wounds were localized on the face. What curative-prophylactic aid should be given to prevent rabies?
- A** Start immunization with rabies vaccine
  - B** Hospitalize the patient and keep under the doctors supervision
  - C** Immediately inject normal gamma globulin
  - D** Prescribe combine antibiotic therapy
  - E** Immediate injection of DPT (Diphtheria, Pertussis, Tetanus) vaccine
- 11.** In a patient with clinical signs of immunodeficiency the number and functional activity of T and B lymphocytes are not changed. Defect with dysfunction of antigen-presentation to the immunocompetent cells was found during investigation on the molecule level. Defect of what cells is the most probable?
- A** Macrophages, monocytes
  - B** 0-lymphocytes
  - C** NK-cells
  - D** T-lymphocytes, B-lymphocytes
  - E** Fibroblasts, T-lymphocytes, B-lymphocytes
- 12.** During influenza epidemic, morbidity in the schoolchildren, who did not participate in sports, was 40%, while in the schoolchildren, who engaged in regular physical activities, morbidity did not exceed 20%. What adaptation mechanism ensured low morbidity in the physically active schoolchildren?
- A** Cross-adaptation
  - B** Specific adaptation
  - C** Physiological adaptation
  - D** Biochemical adaptation
  - E** Genetic adaptation
- 13.** A 5-year-old child is diagnosed with Bruton syndrome (X-linked agammaglobulinemia) that manifests itself as severe clinical course of bacterial infections and absence of B lymphocytes and plasma cells. What changes of immunoglobulin content can be observed in blood serum of the child with immunodeficiency?
- A** Decreased IgA, IgM
  - B** Increased IgA, IgM
  - C** Decreased IgD, IgE
  - D** Increased IgD, IgE
  - E** No changes
- 14.** A young woman, a foreign student from Tehran, has made an appointment with the urologist. She complains of the sensation of heaviness in her lower abdomen and a small amount of blood being excreted with urine at the end of each urination. Microscopy of urine detects the presence of parasite eggs, approximately 140x70 micron in size, with a terminal spike. What diagnosis can be made by the infectious diseases specialist?
- A** Schistosomiasis
  - B** Opisthorchiasis
  - C** Dicrocoeliasis
  - D** Paragonimiasis
  - E** Fascioliasis
- 15.** Sanitary assessment of a pond, where the children from a recreation summer camp take their swims, detected there oval cysts 50-60 micron in diameter, with 2 nuclei visible in their cytoplasm (macronucleus and micronucleus). What protozoa do these cysts belong to?
- A** Balantidium
  - B** Lamblia
  - C** Toxoplasma
  - D** Amoeba
  - E** Euglena

**Exercise 2. Translate the word-combinations into Ukrainian.**

To specify the most correct etiological name, an outbreak of hepatitis, provisionally diagnosed with typhoid fever, sputum smears, staining technique, oval eggs covered with lumpy capsules, a thin film on the medium surface, infested pork, gram-negative curved mobile monotrichous bacilli, arcuate bent microorganisms, mass mortality of rodents, immune-enzyme assay, liquid faeces with mucus and blood, pyriform protozoa with twin nuclei, four pairs of flagella, the scrape from the perianal folds, a strain of intestinal rod-shaped bacteria, to give birth to a stillborn baby, gram-negative ovoid bacilli with bipolar staining, filter paper impregnated with antitoxic diphtherial serum, a suctorial disc on the ventral side, identification of the causative agent by its motility.

**Exercise 3. Match the terms to the definitions**

**Basic Infectiology Terminology (Pathogen)**

Term	Explanation
1. Saprophytes	1) Classic disease-causing pathogens
2. Parasites	2) Smallest number of pathogens sufficient to cause an infection
3. Commensals	3) Can cause disease in immune-compromised individuals; these are frequently germs of the normal flora or occasionally from the surrounding environment, animals, or other germ carriers
4. Pathogenic microorganisms	4) Unicellular or metazoan organism living in or on an organism of another species (host) on the expense of the host Classic disease-causing pathogens
5. Opportunists or facultatively pathogenic microorganisms	5) Normal inhabitants of skin and mucosa; the normal flora is thus the total commensal population
6. Pathogenicity	6) The totality of host species “susceptible” to infection by a given pathogen
7. Virulence	7) Method or pathway used by pathogen to invade host
8. Incubation period	8) A parasitological term: time between infection and first appearance of products of sexual reproduction of the pathogen (e.g., worm eggs in stool of a host with helminthiasis)
9. Prepatency	9) Sum of the disease-causing properties of a strain of a pathogenic species
10. Infection spectrum	10) Time between infection and manifestation of disease symptoms; this specific disease characteristic can be measured in hours, days, weeks, or even years
11. Minimum infective dose	11) These microorganisms are nonpathogenic; their natural habitat is dead organic matter
12. Mode of infection	12) Capacity of a pathogen species to cause disease

**Exercise 4. Match the diseases to the causative agents (or the type of infectious agents).**

anthrax	Shigella or Entamoeba histolytica
plague	Streptococcus pyrogen's
cholera	Bacillus
typhoid fever	Clostridium
leprosy	Yersinia pestis
dysentery	Salmonella enterica
scarlet fever	Plasmodium

botulism	Treponema pallidum
malaria	Virus
syphilis	Vibrio
mumps	Mycobacterium

**Exercise 5. Complete each sentence with the correct ending from box B**

A	B
1) Mycobacteria are slender rod bacteria that are stained ...	1) ... remain clinically silent.
2) Ninety percent of primary infection foci ...	2) ... on the skin, mucosa, and peripheral nerves
3) Humans show a considerable degree ...	3) ... atypical mycobacteria (old designation), nontuberculous mycobacteria (NTM) or MOTT (mycobacteria other than tubercle bacilli).
4) Diagnosis requires microscopic and cultural identification ...	4) ... with special differential stains (Ziehl-Neelsen).
5) Leprosy is manifested mainly ...	5) ... of genetically determined resistance to TB.
6) Mycobacteria that are neither tuberculosis nor leprosy bacteria are categorized as ...	6) ... a purulent conjunctivitis, seen mainly in new-born children.
7) Gonococci are Gram-negative, coffee-bean-shaped cocci ...	7) of the pathogen or pathogen-specific DNA.
8) Gonococci reaching the conjunctival membrane may cause ...	8) ... by smear infection or indirect via food and drinking water.
9) Species with many flagella (e.g., Proteus species) show motility ...	9) that are usually paired and have a diameter of approximately 1 $\mu$ m.
10) Transmission is either direct ...	10) ... on the agar surface.

**4. Підбиття підсумків.**

**5. Список рекомендованої літератури**

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## Практичне заняття № 20

### Тема: MICROBIOLOGY. PART III.

**Мета:** ознайомити здобувачів вищої освіти з медичними термінами, що стосуються мікробіології та клінічними кейсами інфекційних захворювань: їх переклад, особливості словотворення, аналіз елементів греко-латинського походження.

**Основні поняття:** мікробіологія, інфекційні захворювання.

### План

1. **Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

### 2. Контроль опорного рівня знань.

What are the most common infectious diseases?

How are they diagnosed?

### 2. Формування професійних вмінь, навичок:

#### Exercise 1. Read and translate the tests.

1. 48 hours after tuberculin test (Mantoux test) a child had a papule 10 mm in diameter on the spot of tuberculin injection. What hypersensitivity mechanism underlies these changes?

- A Cellular cytotoxicity
- B Anaphylaxis
- C Antibody-dependent cytotoxicity
- D Immunocomplex cytotoxicity
- E Granulomatosis

2. A patient has been suffering from diarrhoea for 5 day. On the fifth day colonoscopy revealed that membrane of rectum was inflamed, there were greyish-green films closely adhering to the subjacent tissue. What is the most probable diagnosis?

- A Dysentery
- B Typhoid fever
- C Nonspecific ulcerative colitis
- D Salmonellosis
- E Crohn's disease

3. A patient has acne on his face. Microscopic examination of scrapings from the affected areas revealed living porrect vermiform Arthropoda 0,2-0,5 mm large with four pairs of short extremities in the front part of their bodies. What is the laboratory diagnosis?

- A Demodicosis
- B Scabies
- C Myiasis
- D Pediculosis
- E Phthiriasis

4. A patient has been suffering from elevated temperature and attacks of typical cough for 10 days. Doctor administered inoculation of mucus from the patient's nasopharynx on the agar. What microorganism is presumed?

- A Pertussis bacillus
- B Pfeiffer's bacillus
- C Listeria
- D Klebsiella
- E Staphylococcus

5. A bacteriological laboratory received sputum sample of a patient suffering from tuberculosis. Bacterioscopic examination of smears and detection of tuberculosis bacillus can be realized by one of enrichment methods that involves processing of sputum only with solution of caustic soda. What is this method called?
- A Homogenization
  - B Inactivation
  - C Flotation
  - D Filtration
  - E Neutralization
6. A patient had been suffering from profuse diarrhoea and vomiting for 2 days. He died from acute dehydration. Autopsy revealed that the intestinal wall was oedematous and hyperaemic, with multiple haemorrhages in the mucous membrane. Intestinal lumen contains whitish fluid resembling of rice water. What disease caused death?
- A Cholera
  - B Dysentery
  - C Salmonellosis
  - D Typhoid fever
  - E Enterocolitis
7. Material taken from a patient with provisional diagnosis "influenza" was referred to a laboratory. For virologic examination the hemadsorption reaction was applied. This reaction can be applied for detection of the following viruses:
- A Viruses containing hemagglutinins
  - B All the simple viruses
  - C All the complex viruses
  - D DNA-genomic viruses
  - E Any viruses
8. A 23-year-old man has perforation of hard palate. In the area of this perforation there was a compact well-defined formation. Microscopic examination of the resected formation revealed a large focus of caseous necrosis surrounded by granulation tissue with endovasculitis, cellular infiltration composed of lymphocytes, epithelioid cells (mainly plasmocytes). What is the most probable diagnosis?
- A Syphilis
  - B Tuberculosis
  - C Scleroma
  - D Sarcoma
  - E Leprosy
9. After inoculation of investigated material (faeces) on 1% alkaline peptone water and 8-hour-long incubation in the thermostat under 37°C there is growth of pale bluish film observed. Such cultural properties are characteristic of the agent of the following disease:
- A Cholera
  - B Plague
  - C Typhoid fever
  - D Paratyphoid A fever
  - E Dysentery
10. Examination of a patient with pustular skin lesions allowed to isolate a causative agent that forms in the blood agar roundish yellow middle-sized colonies surrounded by haemolysis zone. Smears from the colonies contain irregular shaped clusters of gram-positive cocci. The culture is oxidase- and catalase positive, ferments mannitol and synthesizes plasmocoagulase. What causative agent was isolated?
- A Staphylococcus aureus
  - B Streptococcus agalactiae
  - C Streptococcus pyogenes

D Staphylococcus epidermidis

E Staphylococcus saprophyticus

11. Microscopic examination of a Gram-stained scrape from patient's tongue revealed oval, round, elongated chains of dark-violet gemmating cells. What disease can be caused by this causative agent?

A Candidiasis (thrush)

B Actinomycosis

C Streptococcal infection

D Staphylococcal infection

E Diphtheria

12. Blood of a patient with presumable sepsis was inoculated into sugar broth. There appeared bottom sediment. Repeated inoculation into blood agar caused growth of small transparent round colonies surrounded by haemolysis zone. Examination of a smear from the sediment revealed gram-positive cocci in form of long chains. What microorganisms are present in blood of this patient?

A Streptococci

B Micrococci

C Staphylococci

D Tetracocci

E Sarcina

13. In order to estimate toxigenicity of diphtheria agents obtained from patients the cultures were inoculated on Petri dish with nutrient agar on either side of a filter paper strip that was put into the centre and moistened with antidiphtheric antitoxic serum. After incubation of inoculations in agar the strip-like areas of medium turbidity were found between separate cultures and the strip of filter paper. What immunological reaction was conducted?

A Precipitation gel reaction

B Coomb's test

C Agglutination reaction

D Rings precipitation reaction

E Opsonization reaction

14. A patient with clinical signs of encephalitis was delivered to the infectious diseases hospital. Anamnesis registers a tick bite. Hemagglutination-inhibition reaction helped to reveal antibodies to the causative agent of tick-borne encephalitis in the dilution 1:20 which is not diagnostic. What actions should the doctor take after he had got such result?

A To repeat the examination with serum taken 10 days later

B To examine the same serum

C To apply more sensitive reaction

D To repeat examination with another diagnosticum

E To deny diagnosis of tick-borne encephalitis

15. A culture of monkey cells (Vero) and a group of suckling mice were infected with an inoculum taken from a child with provisional diagnosis "enterovirus infection". There was no cytopathic effect on the cell culture but suckling mice died. What enteric viruses might have caused disease of this child?

A Coxsackie A

B Coxsackie B

C ECHO virus

D Polioviruses

E Unclassified enteric viruses

**Exercise 2. Translate the word-combinations into Ukrainian.**

Microscopic examination of scrapings, living porrect vermiform Arthropoda, fusiform spore forming microorganisms, a large focus of caseous necrosis, elongated chains of dark-violet gemmating cells, moistened with antidiphtheric antitoxic serum, inoculated into sugar broth, a smear from the sediment, the strip-like areas of medium turbidity, old burial ground for animal refuse, the causative agent of tick-borne encephalitis, an undulating membrane, gram-positive bacilli with clublike thickenings on their ends, a prolonged period of dormancy, blue bacilli with a thickening at the poles, crescent-shaped bodies with pointed tips, gram-negative bean-shaped diplococcus, mobile convoluted microorganisms, marked nuchal rigidity, halfmoon-shaped unicellular organisms with pointed ends.

### Exercise 3. Match the terms to the definitions

#### Basic Infectiology Terminology (Host)

Term	Explanation
1. Contamination	1) Infection arising from invasion of host by microorganisms from sources external to it
2. Colonization	2) Infection that remains restricted to the portal of entry and surrounding area
3. Infection	3) Brief presence of microorganisms in the bloodstream
4. Inapparent (or subclinical) infection	4) Lymphogenous and/or hematogenous spread of invading pathogen starting from the portal of entry; infection of organs to which pathogen shows a specific affinity (organotropism); three stages: incubation, generalization, organ manifestation
5. Infectious disease (or clinical infection)	5) Occurrence of a second infection in the course of a first infection
6. Probability of manifestation	6) Series of infections by different pathogens
7. Endogenous infection	7) Series of infections by the same pathogen
8. Exogenous infection	8) Frequency of clinical manifestation of an infection in disposed individuals (%)
9. Nosocomial infection	9) Infection acquired during hospitalization (urinary tract infections, infections of the respiratory organs, wound infection, sepsis)
10. Local infection	10) Infection arising from the colonizing flora
11. Generalized infection	11) Infection without outbreak of clinical symptoms
12. Sepsis	12) Systemic disease caused by microorganisms and/or their toxic products; there is often a localized focus of infection from which pathogens or toxic products enter the bloodstream continuously or in intermittent phases
13. Transitory bacteraemia/viremia/parasitaemia	13) Infection with outbreak of clinical symptoms
14. Superinfection	14) Presence of microorganisms on skin or mucosa; no penetration into tissues; typical of normal flora; pathogenic microorganisms occasionally also show colonization behaviour
15. Relapses	15) Invasion of a host organism by microorganisms, proliferation of the invading organisms, and host reaction
16. Reinfection	16) Microbiological presence of microorganisms on objects, in the environment, or in samples for analysis

### Exercise 4. Match the diseases to the vector of the causative agent, its common name, and morphology of the corresponding parasitic arthropods.

Disease	Vector of the causative agent	Common name	Morphology
Lyme borreliosis and “early summer meningoencephalitis”	Sarcoptes scabiei	Lice (Sing. louse)	About 0.2–0.5 mm long with ovoid bodies. The adults and nymphs have four pairs of legs, the larva has three pairs of legs. Following transmission to a human host a female penetrates into the epidermis and begin to tunnel
Scabies	Anoplura	Ticks	Dorsoventrally flattened insects, about 1.5–4 mm in length, wingless, with reduced eyes, short (five-segmented) antennae, piercing and sucking mouthparts, and strong claws designed to cling to hairs
Pediculosis and Phthiriasis	Ixodes	Mites	Male: about 2–3 mm long with a highly chitinized scutum covering the entire dorsal surface. Female: 3–4 mm, up to 12 mm when fully engorged after a blood meal; the scutum covers only the anterior portion of the body. Adults and nymphs (the latter about 1 mm long) have four pairs of legs, the smaller larvae (about 0.5 mm long) only three pairs. Possess characteristic piercing mouthparts.

#### Exercise 5. Match the words with the similar meaning.

vermiform	halfmoon-shaped
sediment	wavy
porrect	cloudiness
rigidity	worm-like
undulating	precipitate
turbidity	curettage
crescent-shaped	resembling
predominantly	extended forwards
scraping	mostly
similar	stiffness

#### 4. Підбиття підсумків.

#### 5. Список рекомендованої літератури

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## Практичне заняття № 21

### Тема: PHARMACOLOGY. PART I.

**Мета:** ознайомити здобувачів вищої освіти з медичними термінами, що стосуються фармакології: їх переклад, особливості словотворення, аналіз елементів греко-латинського походження.

**Основні поняття:** фармакологія, ліки, антидоти, шлях застосування, показання.

#### План

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

#### 2. Контроль опорного рівня знань.

What is a drug?

What main groups of drugs do you know?

What are the ways of drug administration?

#### 3. Формування професійних вмінь, навичок:

##### Exercise 1. Read and translate the tests:

1. A woman with seasonal vasomotor rhinitis, who works as a train dispatcher and is an outpatient, should be prescribed an antihistaminic drug that does not suppress the central nervous system. Name this drug:

1. Loratadine
2. Dimedrol (Diphenhydramine)
3. Diprazine (Promethazine)
4. Suprastin (Chloropyramine)
5. Tavegyl (Clemastine)

2. A pregnant woman with several miscarriages in anamnesis is prescribed a therapy that includes vitamin preparations. What vitamin facilitates carrying of a pregnancy?

3. Alpha-tocopherol
4. Folic acid
5. Cyanocobalamin
6. Pyridoxal phosphate
7. Rutin

3. During treatment with bismuth preparations a patient with syphilis developed graygrey spots on his oral mucosa and nephropathy symptoms. What drug is used as an antidote to bismuth preparations poisoning?

1. Unithiol
2. Nalorphine
3. Bemegride
4. Naloxone
5. Methylene blue

4. On the 2-3 day after the gastric resection the patient's intestinal peristalsis failed to restore. What should the patient be prescribed to stimulate the function of his gastrointestinal tract?

3. Proserin
4. Platyphyllin
5. Cyclodol (Trihexyphenidyl)

6. Atropine
  7. Diethyline (Suxamethonium chloride)
5. A man came into the admission room with complaints of edemas, rapid heart rate, dyspnea, and cyanotic mucosal tunics. He was diagnosed with chronic heart failure. What drug should be prescribed to improve the patient's general state?

5. Digoxin
6. Papaverine hydrochloride
7. Mesaton (Phenylephrine)
8. Cordiamin
9. Nitroglycerine

6. A patient complaining of dizziness, thirst, difficult swallowing, and impaired vision of close objects has addressed a doctor. Objectively: respiratory rate is increased, pupils are dilated, general agitation, talkativeness, though the speech is indistinct. BP is 110/70 mm Hg, heart rate is 110/min. Given symptoms can indicate overdose of the following drug:

3. Atropine
4. Morphine
5. Ephedrine
6. Aminazine

#### 7. Caffeine

7. Due to prolonged taking of a drug the patient can develop osteoporosis, gastric mucosal erosions, hypokalemia [hypokalaemia](#), sodium and water retention, and decreased blood content of corticotropine [corticotrophin](#). Specify this drug:

5. Prednisolone
6. Hydrochlorothiazide
7. Digoxin
8. Indometacin
9. Reserpine

8. A woman with polyarticular rheumatoid arthritis was prescribed a non-steroidal antiinflammatory [anti-inflammatory](#) drug - diclofenac sodium. After the patient has been taking it for some time, her concomitant disease exacerbated, which forced the doctor to cancel the prescription of this drug. What concomitant disease could necessitate cancellation of this drug prescription?

- A. Ulcer disease
- B. Ischemic heart disease
- C. Diabetes mellitus
- D. Essential hypertension
- E. Bronchial asthma

9. During regular check-up a child is determined to have interrupted mineralization of the bones. What vitamin deficiency can be the cause?

1. Calciferol
2. Riboflavin
3. Tocopherol
4. Folic acid
5. Cobalamin

10. A 46-year-old patient suffering from ulcer disease of the stomach is diagnosed with rheumatoid arthritis. What antiinflammatory [anti-inflammatory](#) drug would be most advisable in this case?

5. Celecoxib
6. Prednisolone
7. Analgin [Analgen](#) (Metamizole)
8. Promedol (Trimeperidine)
9. Paracetamol

11. A patient suffers from acute cardiopulmonary failure with pulmonary edema. What diuretic should be prescribed in the given case?

1. Furosemide
2. Triamterene
3. Spironolactone
4. Dichlothiazidum (Hydrochlorothiazide)
5. Diacarb (Acetazolamide)

12. Therapeutics unit of a hospital received a man suffering from ulcer disease of the stomach with hyperacidity. Which of the listed group of drugs must be used as a part of the complex therapy of this patient?

1. Histamine H<sub>2</sub>-receptor antagonists
2. Calcium channel blockers
3. Nonsteroidal antiinflammatory drugs
4. Steroidal antiinflammatory drugs
5. Histamine H<sub>1</sub>-receptor antagonists

13. During gastric resection the patient received mixed anesthesia with tubocurarin chloride muscle relaxant; to restore spontaneous respiration the patient received proserin. What pharmacological group does this drug belong to?

1. Cholinesterase inhibitors
2. Angiotensin-converting-enzyme inhibitors
3. Calcium channel blockers
4. Muscarinic antagonists
5. Muscarinic agonists

14. To treat bronchitis the patient was prescribed a beta-lactam antibiotic. Its mechanism of action is based on inhibition of murein production, which results in death of the causative agent. Name this drug:

1. Penicillin G Sodium Salt
2. Bijochinol (Quinine bismuth iodide)
3. Ciprofloxacin
4. Azithromycin
5. Streptomycin

15. A 38-year-old woman developed a bronchial asthma attack. Which of the listed bronchial spasmolytics is effective for emergency aid and belongs to beta-2-adrenergic agonists?

3. Salbutamol
4. Adrenaline
5. Ipratropium bromide
6. Platyphyllin
7. Atropine

**Exercise 2. Translate the word combinations into Ukrainian:**

Suppress the central nervous system; several miscarriages in anamnesis; facilitate carrying of a pregnancy; intestinal peristalsis failed to restore; admission room; complaints of edemas, rapid heart rate and dyspnea; diagnosed with chronic heart failure; impaired vision of close objects; dilated pupils; indistinct speech; indicate overdosage of a drug; develop water retention; concomitant disease exacerbated; cancel prescription of a drug; necessitate cancellation; prescribe a drug with mucolytic action; specify the sleep-inducing mechanism of a drug; an appropriate drug; remove the complication; absence of marked sedative action; persistent edemas.

**Exercise 3. Give synonyms of the following words:**

prescribe		fast	
lower		worsening	

treatment		detect	
adverse effects		medication	
stop		excitation	

**Exercise 4. Match the terms with their definitions:**

1) neurotransmitter	a) the innermost part of the adrenal gland, consisting of cells that secrete <u>epinephrine</u> (adrenaline), <u>norepinephrine</u> (noradrenaline), and a small amount of <u>dopamine</u> in response to stimulation by <u>sympathetic preganglionic neurons</u>
2) synaptic cleft	b) an extreme, often life-threatening allergic reaction to an antigen to which the body has become hypersensitive.
3) adrenal medulla	c) breakdown of the molecule glycogen into glucose, a simple sugar that the body uses to produce energy
4) catecholamine	d) breakdown of fats and other lipids by hydrolysis to release fatty acids
5) glycogenolysis	e) a group of eye diseases which result in damage to the <u>optic nerve</u> and cause <u>vision loss</u>
6) lipolysis	f) the space that separates a neuron and its target cell at a chemical <u>synapse</u> .
7) glaucoma	g) a <u>monoamine neurotransmitter</u> , an <u>organic compound</u> that has a <u>catechol</u> ( <u>benzene</u> with two <u>hydroxyl</u> side groups next to each other) and a <u>side-chain amine</u>
8) anaphylactic shock	h) a chemical substance which is released at the end of a nerve fiber <u>fiber</u> by the arrival of a nerve impulse and, by diffusing across the synapse or junction, effects the transfer of the impulse to another nerve fiber <u>fiber</u> , a muscle fiber <u>fiber</u> , or some other structure

**Exercise 5. Fill the gaps in the text with the missing parts:**

**Antifungal drugs**

Molds Moulds, yeasts, and 1. \_\_\_\_\_ are all types of fungi. Of the millions of different species of fungi, only a few hundred are responsible for making people sick. Fungi can cause a variety of conditions. Most of them affect the nails or skin, causing 2. \_\_\_\_\_ conditions, but some can cause more serious infections. Fungi can cause 3. \_\_\_\_\_, blood infections, and lung infections. Antifungal drugs are the medications people use to treat fungal infections. People can take antifungal drugs orally, apply them topically, or administer them intravenously 4. \_\_\_\_\_. Antifungal medications usually work either by killing the fungal cells or stopping them from 5. \_\_\_\_\_.

There are four main types of antifungal drugs. These are:

1. polyenes work by 6. \_\_\_\_\_ of the fungal cells to be more porous, thus making them more likely to burst
2. azoles are known to be 7. \_\_\_\_\_ which inhibit the synthesis of sterol in fungi
3. allylamines work by inhibiting an enzyme that the membrane of the cell requires to operate correctly

4. echinocandins interfere with an enzyme involved in creating the fungal cell wall.

growing and multiplying	rashes or other skin	fungistatic agents	cell wall
altering the wall	meningitis	mushrooms	through an IV drip

#### Exercise 6. Match the parts of the sentences.

1.	Your test results	a	test came back positive/negative
2.	I'm afraid	b	the prognosis isn't good
3.	You have a long	c	you're ready to go home
4.	We have several	d	options to discuss
5.	The blood	e	here overnight
6.	The transfusion	f	diabetes
7.	It looks like	g	road to recovery
8.	I'd like to keep you	h	have come in
9.	You're not	i	in the clear yet
10.	We've ruled out	j	was a success

#### 4. Підбиття підсумків.

#### 5. Список рекомендованої літератури

##### Основна

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##### Електронні інформаційні ресурси:

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6. Free Online Term Extractors  
<http://recremisi.blogspot.com/p/online-term-extractors.html>
7. Medical Dictionary Online  
<https://www.online-medical-dictionary.org/>

## Практичне заняття № 22

### Тема: PHARMACOLOGY. PART II.

**Мета:** ознайомити здобувачів вищої освіти з особливостями перекладу, критичним аналізом ситуативних завдань, клінічних кейсів та навчити опису специфіки фармакологічної терапії англійською мовою.

**Основні поняття:** фармакологія, ліки, антидоти, шлях застосування, показання.

### План

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What is a drug?

What main groups of drugs do you know?

What are the ways of drug administration?

**3. Формування професійних вмінь, навичок:**

#### Exercise 1. Read and translate the tests:

1. A patient with chronic heart failure with edema has increased level of blood aldosterone. What diuretic would be most effective in this case?

A. Spironolactone

1. Triamterene
2. Acetazolamide
3. Hydrochlorothiazide
4. Furosemide

2. A patient complaining of rapid pulse, dyspnea and bluish color of mucosa has been admitted to the cardiological department. The objective symptoms are as follows: edema of lower extremities, ascites. Which of the given medicines should be prescribed for intravenous administration to improve the patient's general state?

1. Corglyconum
2. Cordiamin
3. Adrenalin hydrochloride
4. Digitoxin
5. Drotaverine

3. A patient who had been taking diclofenac sodium for arthritis of mandibular joint developed an acute condition of gastric ulcer. Such side effect of this medicine is caused by inhibition of the following enzyme:

1. Cyclooxygenase-1 (COX-1)
2. Cyclooxygenase-2 (COX-2)
3. Lipoxygenase
4. Phosphodiesterase
5. Monoamine oxidase

4. A 55-year-old male had been delivered to the resuscitation unit unconscious. Relatives reported him to have mistakenly drunk an alcoholic solution of unknown origin. On examination the patient was diagnosed with methanol intoxication. What antidote should be used in this case?

1. Ethanol
2. Teturamum

3. Naloxone
  4. Protamine sulfate
  5. Acetylcysteine
5. A 68-year-old patient consults a cardiologist, complaining of high arterial blood pressure, pain in the heart region, intermittent pulse. Prescribe the  $\beta_1$ -adrenoreceptor blocker for the treatment of the described pathology:
- 1) Metoprolol
  - 2) Morphine hydrochloride
  - 3) Nootropil
  - 4) Fenoterol
  - 5) Benzylpenicillin
6. A 35-year-old female patient has been hospitalised with acute intoxication caused by salts of high-density metals (lead, most probably). As a part of complex therapy the antidote that contains two active sulfhydryl groups has been prescribed. Specify this antidote:
- 1) Dimercaprol
  - 2) Metamizole
  - 3) Mannitol
  - 4) Nalorphine hydrochloride
  - 5) Calcium chloride
7. A 63-year-old male patient with bladder atony had been prescribed a medication, which he had been arbitrarily taking at a higher dose. The patient developed hyperhydration, salivation, diarrhea, muscle spasms. The prescribed drug relates to the following group:
- 1) Cholinomimetics
  - 2) Cholinesterase reactivators
  - 3) Adrenergic blockers
  - 4) Tocolytics
  - 5) Ganglionic blockers
8. A patient complains of photoreception disorder and frequent acute viral diseases. He has been prescribed a vitamin that affects photoreception processes by producing rhodopsin, the photosensitive pigment. What vitamin is it?
- A. Retinol acetate
  - B. Tocopherol acetate
  - C. Pyridoxine hydrochloride
  - D. Cyanocobalamin
  - E. Thiamine
9. A girl receives antibiotics of the penicillin group for acute bronchitis. On the third day of treatment she developed allergic dermatitis. Which drug should be administered?
1. Loratadine
  2. Cromolyn sodium
  3. Beclomethasone
  4. Ephedrine hydrochloride
  5. Levamisole
10. It is known that individuals with genetically caused deficiency of glucose-6-phosphate dehydrogenase may develop RBC hemolysis in response to the administration of some antimalarial drugs. Manifestation of adverse reactions to drugs is called:
- 1) Idiosyncrasy
  - 2) Allergy
  - 3) Sensibilization
  - 4) Tachyphylaxis
  - 5) Tolerance
11. A patient with urolithiasis has unbearable spasmodic pain. To prevent pain shock, he has

been given an injection of atropine along with a narcotic analgesic having antispasmodic effect.

What drug was it?

- 1) Promedol
- 2) Nalorphine
- 3) Tramadol
- 4) Ethylmorphine hydrochloride
- 5) Morphine hydrochloride

12. Despite the administration of cardiotonics and a thiazide diuretic a patient with chronic heart failure has persistent edemata, there is a risk of ascites. What medication should be administered in order to enhance the diuretic effect of the drugs used?

- 1) Spironolactone
- 2) Furosemide
- 3) Amiloride
- 4) Clopamide
- 5) Manithol

13. A 66-year-old patient with Parkinson's disease shows an improvement in locomotor activity after prolonged use of a certain drug which is converted to dopamine by the decarboxylation.

What drug has the patient taken?

1. Levodopa
2. Naloxone
3. Celecoxib
4. Droperidol
5. Chlorpromazine

14. A patient has recurrent attacks of epileptic seizures and stays unconscious between them. In order to stop convulsions, the drugs of the following group should be used in the first place:

1. Tranquilizers
2. Neuroleptics
3. Muscle relaxants
4. Sedatives
5. Analeptics

15. A patient with arthritis and varicose veins has been taking a non-steroidal antiinflammatory drug for a long time, which caused thrombosis of skin veins. Which of the following drugs might have caused this complication?

1. Celecoxib
2. Indomethacin
3. Aspirin
4. Phenylbutazone
5. Ibuprofen

### **Exercise 2. Translate the word combinations into Ukrainian:**

Detect ascarid eggs; be born asphyxiated; bluish color of mucosa; prescribed for intravenous administration; arthritis of mandibular joint; be delivered to the resuscitation unit unconscious; alcoholic solution of unknown origin; broad spectrum antibiotic; causal treatment drug; intermittent pulse; salts of high-density metals; male patient with bladder atony; complain of photoreception disorder; prolonged nosebleeds; efficient in remedying a condition; a patient with biliary dyskinesia and constipations; laxative effect; manifestation of adverse reactions; unbearable spasmodic pain; persistent edemata; enhance the diuretic effect; recurrent attacks of epileptic seizures; reveal numerous subcutaneous hemorrhages; causative agent resistant to penicillin; take an antacid drug for heartburn elimination; a sensation of stomach swelling; complain of morbid thirst and hyperdiuresis.

### **Exercise 3. Find synonyms of the following words in the tests:**

urinate		bring	
primary hypertension		wide	
efficient		epistaxis	
suitable		treat	
respiration		obstipation	

**Exercise 4. Match the terms with their definitions:**

1) broad spectrum antibiotic	a) occasional beats are skipped, caused by conditions such as premature atrial contractions, premature ventricular contractions, and atrial fibrillation. Synonym: irregular pulse.
2) intermittent pulse	b) an escape of blood from a ruptured blood vessel.
3) biliary dyskinesia	c) sometimes called a flaccid.
4) hemorrhages	d) acts on the two major bacterial groups, gram-positive and gram-negative, or any antibiotic that acts against a wide range of disease-causing bacteria.
5) elimination	e) is a substance which neutralizes stomach acidity and is used to relieve heartburn, indigestion or an upset stomach.
6) antacids	f) an abnormal or excessive thirst, or a craving for unusual forms of drink.
7) atonic bladder	g) is a disorder of some component of biliary part of the digestive system in which bile physically can not <b>cannot</b> move normally in the proper direction through the tubular biliary tract.
8) morbid thirst	h) the complete removal or destruction of something.

Exercise 5. Fill the gaps in the text with the missing parts:

**Neurotransmitters.**

Each neuron is a distinct anatomic unit. Communication between nerve cells – and between nerve cells and effector organs – 1 \_\_\_\_\_, called neurotransmitters, from the nerve terminals. This release depends on processes that are triggered by  $Ca^{++}$  uptake and regulated by phosphorylation of synaptic proteins. The neurotransmitters rapidly diffuse across 2 \_\_\_\_\_ between nerve endings and 3 \_\_\_\_\_.

Types of neurotransmitters. Although over 50 chemical signal molecules in the nervous system have tentatively been identified, 6 signal compounds–norepinephrine (and closely related epinephrine), acetylcholine, dopamine, serotonin, histamine, and  $\gamma$ -amino butyric acid–are most 4 \_\_\_\_\_. Each of these chemical signals binds to a specific family of receptors. Cholinergic and adrenergic neurotransmitters are 5 \_\_\_\_\_ in the autonomic nervous system, whereas a wide variety of neurotransmitters function in the CNS.

Acetylcholine. 6 \_\_\_\_\_ can be classified into two groups based 7 \_\_\_\_\_. If transmission is mediated by acetylcholine, the neuron is termed **cholinergic**. Acetylcholine mediates 8 \_\_\_\_\_ in both the sympathetic and parasympathetic nervous systems. It is the neurotransmitter at the adrenal medulla.

Transmission from the autonomic postganglionic nerves to the effector organs in the parasympathetic system also involves the release of acetylcholine.

- 1) the primary chemical signals
- 2) the transmission of nerve impulses across autonomic ganglia
- 3) occurs through the release of specific chemical signals
- 4) commonly involved in the actions of therapeutically useful drugs
- 5) on the chemical nature of the neurotransmitter released
- 6) the synaptic cleft or gap (synapse)
- 7) combine with specific receptor on the postsynaptic (target) cell

## 8) the autonomic nerve fibers

### Exercise 6. Match the terms to their definitions.

amebic dysentery, bladder atony, epileptic seizures, gastric ulcer, gingivostomatitis, heart failure, hyperdiuresis, myasthenia, urolithiasis, nephropathy, polyneuritis, , tuberculosis

1. an open sore or raw area in the lining of the stomach or intestine.
2. a lifelong condition in which the heart muscle can't pump enough blood to meet the body's needs for blood and oxygen.
3. a chronic autoimmune, neuromuscular disease that causes weakness in the skeletal muscles
4. the formation of calcifications in the urinary system, usually in the kidneys or ureters, but may also affect the bladder and/or urethra.
5. the clinical manifestation of an abnormal, excessive, purposeless and synchronized electrical discharge in the brain cells.
6. a severe form of amebiasis associated with stomach pain, bloody stools (poop), and fever.
7. the inability to effectively contract the bladder resulting in excessive urine storage
8. a painful oral infection that can cause blisters on the lips and canker sores in the mouth.
9. is caused by a bacterium called Mycobacterium tuberculosis.
10. a broad medical term used to denote disease or damage of the kidney, which can eventually result in kidney failure.
11. excessive secretion of urine
12. the simultaneous malfunction of many peripheral nerves throughout the body.

### 4. Підбиття підсумків.

### 5. Список рекомендованої літератури

#### Основна

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5. Sabluk A. H., Levandovska L.V. English for medical students. – BCB Medicine 2018. - 576 p.

#### Електронні інформаційні ресурси:

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2. Інформаційні матеріали: <http://www.info.odmu.edu.ua>
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## Практичне заняття № 23

**Тема: PHARMACOLOGY PART III GASTROINTESTINAL DRUGS.**

**Мета:** ознайомити здобувачів вищої освіти з медичними термінами, що стосуються фармакологічного лікування хвороб ШКТ.

**Основні поняття:** фармакологія, гастрит, виразка шлунку, антациди.

### План

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What gastro-intestinal diseases do yo know?

What are the main GI symptoms?

How are GI disorders treated?

**3. Формування професійних вмінь, навичок:**

**Exercise 1. Read the word combinations and explain what they mean:**

**1. Inhibit:** inhibit growth; inhibit development; inhibit the process; inhibit desire to do smth.

**2. Promote:** promote healing; promote metabolism; promote good health; promote a healthy lifestyle.

**3. Recur:** a problem which recurs; recur periodically; recurring heartburns.

**4. Resist:** resist gastric acidity; resist antibacterial action; resist cold; hard to resist.

**Exercise 2. Read and the following word combinations and explain what they mean:**

Lining of the esophagus; irritate peptic ulcer; promote healing of the ulcers; cause harmful side effects; purchase prescribed drugs; cause diarrhea; extensive use of antacids; lead to kidney damage; available without a prescription; inhibit production of enzymes.

**Exercise 3. Match each word from column A with its opposite from column B:**

A	B
important	to disapprove
to relieve	to hinder
to prevent	rarely
to promote	to permit
commonly	to diffuse
to recommend	to aggravate
to accumulate	minor

to inhibit	to enable
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**Exercise 4. Match the terms with their definitions:**

1. antacid	a) a sore on the lining of your stomach, small intestine or esophagus				
2. hydrochloric acid	b) a burning pain in your chest, just behind your breastbone				
3. peptic ulcer	c) an uncomfortable condition caused when your body cannot digest food after you have eaten it				
4. heartburn	d) a medicine that relieves heartburn and indigestion by reducing the amount of acid in your stomach				
5. indigestion	e) drugs used to treat duodenal ulcers and prevent their return				
6. H-2 antagonists	f) a muriatic acid or spirits of salt, is an aqueous solution of hydrogen chloride with the chemical formula HCl				
1.	2.	3.	4.	5.	6.

**Exercise 5. Complete the sentences below:**

1. Hydrochloric acid is important ....
2. ... can cause pain when it comes in contact with peptic ulcers.
3. People take antacids to stop ....
4. Many antacid products contain compounds of ...
5. By relieving irritation, antacids can help promote ...
6. Antacids come in ... form.
7. Antacids ordinarily do not cause ...
8. ... promote ulcer healing by reducing the acid and digestive enzymes in the stomach and duodenum.

**Exercise 6. Correct the sentences below:**

1. People take antibiotics to stop the "pain of heartburn and indigestion.
2. Antacid products irritate peptic ulcers.
3. Antacids come in the form of injections.
4. Turns, another common antacid, contains a compound of calcium, that's why it is helpful for ulcer treatment.
5. H-2 antagonists cause many serious side effects.
6. Omeprazole and lansoprazole are more effective than H-2 antagonists.
7. Antibiotics aren't usually prescribed in combination with other drugs.

8. H-2 antagonists promote ulcer healing by stimulating the acid production in the stomach and duodenum.

#### **Exercise 7. Answer the questions to the text:**

1. When can hydrochloric acid cause pain in the stomach?
2. How do antacids help relieve or prevent pain associated with peptic ulcers?
3. What do antacids contain?
4. What problems may result from the long-term use of antacids?
5. How can H-2 antagonists promote ulcer healing?
6. How often are H-2 antagonists taken a day?
7. What drugs can completely inhibit acid secretion?
8. When are antibiotics prescribed for gastrointestinal disorders?

#### **4. Підбиття підсумків.**

#### **5. Список рекомендованої літератури**

##### **Основна**

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##### **Електронні інформаційні ресурси:**

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## Практичне заняття № 24

**Тема: SYSTEMATIZATION: THE MAIN GROUPS OF TERMS USED IN MEDICINE.**

**Мета:** систематизувати отримані здобувачами вищої освіти знання, вміння та навички з медичної англійської мови професійного спрямування.

**Основні поняття:** діабет, СНІД, медична термінологія.

### План

**1. Організаційні заходи** (привітання, перевірка присутніх, повідомлення теми, мети заняття, мотивація здобувачів вищої освіти щодо вивчення теми).

**2. Контроль опорного рівня знань.**

What have you learned on this course?

What is Diabetes?

What do you know about AIDS?

**3. Формування професійних вмінь, навичок:**

**Exercise 1. Read the text “Diabetes” and answer the following questions:**

- 1) What is diabetes mellitus?
- 2) How many types of diabetes you know?
- 3) What is Type 1 diabetes?
- 4) What is Type 2 diabetes?
- 5) What is gestational diabetes?
- 6) When did insulin become available?
- 7) What are the symptoms of diabetes?
- 8) What are the risk factors for Type 1 and Type 2 diabetes?
9. How is diabetes controlled?
10. What are the main complications of diabetes?

**Exercise 2. Say if the statements are true or false according to the text:**

1. Diabetes mellitus is characterized by high blood sugar level.
2. It's a very common disease in the world.
3. There are 2 types of diabetes.
4. Gestational diabetes is diabetes in young children
5. Polydipsia is a classical symptom of diabetes.
6. In type 1 diabetes symptoms develop slowly.
7. Diabetes is an infectious disease
8. Diabetes type 1 is controlled with insulin
9. All diabetic patients must control their level of blood sugar.
10. Diabetic retinopathy, diabetic neuropathy, diabetic nephropathy, foot ulcers are common complications of the disease.

**Exercise 3. Read the text “AIDS” and answer the questions below:**

- 1) What is AIDS?
- 2) What systems does HIV damage?
3. What is the difference between two HIV strains?
4. How is HIV transmitted?
5. What are the stages of HIV infection?
6. What symptoms is each HIV stage characterized by?

7. What illnesses are AIDS patients vulnerable to?
8. What treatment for HIV or AIDS exists nowadays?
9. What is the action of antiretroviral drugs?
10. What are the adverse reactions of HIV drugs?

**Exercise 4. Find the correct answers:**

1. HIV destroys the ... system first.  
a) immune b) respiratory c) nervous d) circulatory
2. ... strains of HIV cause AIDS.  
a) 3 b)4 c)2 d) 6
3. Once immunodeficiency occurs and is not treated, death usually follows ...years of the first onset of symptoms.  
a) 1-2 b) 2-3 c) 4-5 d) 10-11
4. The AIDS virus is transmitted ...  
a) by casual contact b) by talking c) through bodily fluids d) by sharing clothes
5. HIV infection stages are acute infection (also known as primary infection), latency (window period) and ...  
a) the second stage b) AIDS c) HIV 2 d) death
6. During 2-4 weeks post-exposure a person may develop ...  
a) tumours b) ulcers c) influenza-like symptoms d) diarrhea
7. Treatment with ... can prevent AIDS from developing.  
a) antiretroviral drugs b) antibiotics c)barbiturates d) vitamins
8. People living with AIDS are NOT more vulnerable to ... than others:  
a) cancer b) tuberculosis c) caries d) toxoplasmosis
9. AIDS is a ... disease.  
a) bacterial b) infectious c) hereditary d)genetic
- 10) ...is NOT a characteristic side-effect of AIDS.  
a) diarrhea b)headache c)nausea d) fatigue

**Exercise 5. Read the KROK tests:**

- 1).. An..... is a method of quantitative analysis for determining the concentration of an acid or base.  
a) back titration **b) acid - base titration** c) direct titration d) displacement titration
- 1).. An..... is a class of balance designed to measure small mass in the sub-milligram range.  
a) analytical chemistry b) analytical analysis c) analytical determination **d) analytical balance**
- 3..... is an electrode of the device connected to the positive pole of battery.  
**a) anode** b) cathode c) electrode d) wire
- 4..... is a nontoxic or minimally toxic gas which reduces or displaces the normal oxygen concentration in breathing air.  
**a) asphyxiating gas** b) propane gas c) methane gas d) carbon monoxide
- 5..... occurs when two reagents are used - one that reacts with the original sample, and second that reacts with the first reagent.

- a) acid - base titration **b) back titration** c) direct titration d) displacement titration
- 6..... is a generally cylindrical container with a flat bottom.  
a) bottle                      b) test - tube                      **c) beaker**                      d) burette
- 7 .....is a squeeze bottle with a nozzle. It is used to rinse various pieces of laboratory glassware.  
a) flask                      b) syringe                      c) pipette                      **d) bottle**
- 8..... is a graduated glass tube with a tap at one end for delivering known volumes of a liquid, especially in titrations.  
**a) burette**                      b) beaker                      c) test - tube                      d) bottle
9. Lead Nitrate and Sodium Potassium Iodine are..... that form a yellow precipitate for Lead Iodine.  
a) gaseous solutions      b) solid solutions                      **c) colourless solutions**      d) liquid solutions
- 10..... is a piece of furniture where pharmaceutical glassware are dried.  
a) table                      **b) dissicator**                      c) scales                      d) items
- 11.....is a pharmaceutical item for storage of distilled water, solutions.  
a) bottle                      **b) flask**                      c) pipette                      d) beaker
- 12..... is a form of volumetric analysis in which the formation of a coloured complex is used to indicate the end point of a titration.  
**a) complex formation titration**      b) direct titration                      c) back titration      d) displacement titration
- 13.....is a strong, red colour, inclining to purple.  
a) green colour      b) black colour                      c) yellow colour                      **d) crimson colour**
- 14..... is a way to determine the contents of a substance quantitatively.  
**a) direct titration**      b) back titration      c) complex formation titration      d) displacement titration
- 15..... is a second titration for metal ions that do not have a good indicator.  
a) direct titration      b) complex formation titration      **c) displacement titration**      d) back titration
- 16..... is a colourless liquid organic compound with the chemical formula  $\text{CH}_3\text{COOH}$ .  
a) sulphuric acid      **b) acetic acid**      c) oxalic acid      d) uric acid
- 17..... is the organic compound with the formula  $(\text{CH}_3)_2\text{CO}$ .  
**a) acetone**                      b) acetyl                      c) acetylene                      d) alcohol
- 18..... are non-aromatic compounds.  
a) aldehyde      b) acrylonitrile      **c) acidic**                      d) aliphatic hydrocarbon
- 19..... is the amino acid that has a single hydrogen atom as its side chain.  
a) anion                      b) aniline                      **c) glycerol**                      d) aromatic
- 20..... substance doesn't contain water.  
a) anhydride      **b) anhydrous**      c) asymmetric                      d) butyl
- 21.....is an organic compounds bearing the functional group  $\text{R}-\text{N}=\text{N}-\text{R}'$ .  
a) benzene                      b) camphor                      c) carbohydrate      **d) azo dye**
- 22..... is a molecule that features two joined rings.  
**a) bicyclic molecule**      b) monatomic molecule      c) macromolecular molecule      d) neutral molecule
- 23.....is the association of a pair of homologous chromosomes physically held together by at least one DNA crossover.  
a) bonding                      b) carbonic                      **c) bivalent**                      d) cation
- 24..... is a lasting attraction between atoms, ions or molecules that enables the formation of chemical compounds.  
**a) bond**                      b) chlorination                      c) coal                      d) configuration
- 25..... is a colourless liquid with a "sweet" smell that can be detected at low levels.  
a) amine                      **b) carbon tetrachloride**      c) benzoic acid      d) azo dye
- 26..... is an organic compound that contains a carboxyl group ( $\text{C}(=\text{O})\text{OH}$ ).  
a) uric acid                      b) sulphuric acid                      c) acetic acid                      **d) carboxylic acid**

- 27.....is the lightweight black carbon and ash residue hydrocarbon produced by removing water and other volatile constituents from animal and vegetation substances.  
a) coal.....b) dust **c) charcoal** d) sawdust
- 28.....is an acid compound found in citrus fruits.  
**a) citric acid** b) sulphuric acid c) acetic acid d) oxalic acid
- 29..... is the change of the physical state of matter from gas phase into liquid phase.  
a) cellulose b) carbonic c) anthracene **d) condensation**
- 30.....is a system of connected p orbitals with delocalized electrons in a molecule, which in general lowers the overall energy of the molecule and increases stability.  
a) contraction **b) conjugation** c) cycle d) cyanide
- 31..... has to do with the uses of aggravated conditions of heat, humidity, oxygen, sunlight, vibration which speed up the normal aging processes of items.  
**a) accelerated ageing** b) activation energy c) boiling temperature d) conjugation
- 32.....is a general process in which molecules separate or split into smaller particles such as atoms, ions or radicals, usually in a reversible manner.  
a) association **b) dissociation** c) splitting d) combination
- 33 .....replicates the work of the real kidney.  
a) artificial stomach b) artificial liver c) artificial rectum **d) artificial kidney**
- 34.....of an object is the total displacement during some extended period of time, divided by that period of time.  
a) average placement b) average movement **c) average displacement** d) average constituent
- 35..... is a four carbon acid, CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>COOH, with an unpleasant odor.  
**a) butiric acid** b) oxalic acid c) sulphuric acid d) acetic acid
- 36.....is defined as the concentration of surfactants above which micelles form and all additional surfactants added to the system.  
a) charge b) chain **c) critical concentration of micelle - forming** d) coalescence
- 37..... is distributed in the form of small particles (crystals, threads, films or platelets, droplets, or bubbles) in the other, continuous phase, the dispersion medium. a) colloidal dispersion **b) coarse - disperse system** c) condition d) equation
- 38.....is the process by which organic substances are broken down into simpler organic matter.  
a) composition b) structure c) combination **d) decomposition**
- 39.....water can make a liquid thinner or weaker.  
a) mixed **b) diluted** c) transferred d) drop
- 40.....is a structure that appears on the surface of an object when it is exposed to a fluid.  
a) single electrical layer b) third electrical layer **c) double electrical layer** d) fourth electrical layer

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