Form № H - 3.04

National University of Life and Environmental Sciences of Ukraine

Department of Analytical and Bioinorganic Chemistry & Water Quality

"RATIFED"
Dean of the Faculty of Plant Protection,
Biotechnology and Ecology
Dr.Agr.Sc., Prof._____M.M. Doliia
"___"_____ 2015
CONSIDERED AND APPROVED BY
Department of Analytical and Bioinorganic
Chemistry & Water Quality
Protocol # 9 "_23_" __April__2015
Head of the Department
Dr.Chem.Sc., Prof._____V.A. Kopilevich

Working Program for Subject

AQUATIC ECOSYSTEMS
(назва навчальної дисципліни)

specialty **8.04010601** – Ecology end environment protection
(шифр і назва спеціальності)

specialization Ecology end water recourses protection in agrosphere
(назва спеціалізації)

faculty Plant Protection, Biotechnology and Ecology
(назва факультету)

Kyiv-2015

working program ___Aquatic Ecosystems___for students of
(назва навчальної дисципліни)
specialty 8.04010601 Ecology end environment protection.

„___” _____, 2015 . − _13 p._ .

The developers: N.M. Prokopchuk, Associated Professor of the Department of Analytical and Bioinorganic Chemistry & Water Quality, PhD in Chemistry

(вказати авторів, їхні посади, наукові ступені та вчені звання)

The working program was approved at the meeting of the Department of Analytical and Bioinorganic Chemistry & Water Quality _____-_____

_____

Protocol # _9 “ 23 ” __April__2015

Head of the Department of ___ Analytical and Bioinorganic Chemistry & Water Quality , Dr.Chem.Sc., Prof.

_____ (_V.A. Kopilevich_)
(підпис) (прізвище та ініціали)

“_____”_____ 20___ .

Approved by the Scientific Council of Plant Protection, Biotechnology and Ecology Faculty

_____

_____

Protocol # ___ “____”_____20___ .

“_____”_____20__ p. Head _____ (_____)
(підпис) (прізвище та ініціали)

1. Опис навчальної дисципліни

Aquatic Ecosystems

(назва)

Галузь знань, напрям підготовки, спеціальність, освітньо-кваліфікаційний рівень	
Галузь знань	0401 – natural sciences (шифр і назва)
Напрям підготовки	_____ (шифр і назва)
Спеціальність	8.04010601 Ecology end environment protection (шифр і назва)
Освітньо-кваліфікаційний рівень	Master of science (бакалавр, спеціаліст, магістр)
Характеристика навчальної дисципліни	
Вид	selected
Загальна кількість годин	43
Кількість кредитів ECTS	1,2
Кількість змістових модулів	3
Курсовий проект (робота) (якщо є в робочому навчальному плані)	no (назва)
Форма контролю	written test

Показники навчальної дисципліни для денної та заочної форм навчання

	денна форма навчання	заочна форма навчання
Рік підготовки	2	
Семестр	3	
Лекційні заняття	20 год.	год.
Практичні, семінарські заняття	20 год.	год.
Лабораторні заняття	год.	год.
Самостійна робота	год.	год.
Індивідуальні завдання	год.	год.
Кількість тижневих годин для денної форми навчання: аудиторних самостійної роботи студента −	4 год. 54 год.	

2. Purpose and tasks of studying discipline

The permanent use of water resources and other types of natural resources on territories is impossible without the study of conformities to the law of functioning of water ecosystems and introduction of measures on their renewal and maintenance. Growth of the anthropogenic loading and changes of climate influence a considerable rank on natural balance in water ecosystems that in certain terms can result in their degradation. Discipline occupies an important role in the receipt of necessary knowledge in relation to the estimation of the state of water ecosystems and planning of measures on their maintenance. Knowledge of discipline enables at planning be what ethnogeny loadings on territories to take into account the requirements of water ecosystems and examine them as a constituent naturally - technological frames of society, which are the objects of activity of man.

Discipline is directed on preparation of students for specialties 8.070801 – "Ecology end environment protection" (specialization: „ Environmental Quality and System Analysis")", namely acquisition of knowledge and practical skills in relation to the conduct of ecology - hydrological monitoring of different types of water ecosystems and planning of the proper measures on their renewal and maintenance in sladi of computer-integrated projects of water and land management on territories for the decision of tasks of socio- economical development and natural environmental preservation.

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A *purpose* is to learn conformities to the law of functioning of different types of water ecosystems under act of natural and antropogenic factors, to master the methods of estimation of their state and get skills in relation to planning of complex measures on a maintenance and recreation of water ecosystem.

***Tasks*:**

To learn about existent types of water ecosystems and their abiotic and biotic components;

to learn conformities to the law of functioning of different types of water ecosystem (seas, lakes, rivers, vodno- bog lands) under act of anthropogenic and natural factors;

to learn the methods of estimation of the state of superficial water resources; to familiarize with problems and state of ecosystem of pool of Dnepr and Black sea region

to learn the methods of estimation of the state and maintenance of wetlands

to learn the types of the anthropogenic loadings on water ecosystems and methods of improvement of the state of water ecosystem;

to familiarize with bases of ecological - of the hydrological monitoring including with methodology of monitoring of biota of natural waters

to familiarize with consisting of biodiversity of reservoirs of Ukraine and principles of forming of ecological corridors

to familiarize with a current in Ukraine legislation and agricultural policy in part of maintenance of water ecosystem.

Requirements of knowledge and skills acquired during studying the subject.

As a result of study of discipline a student *must know*:

types of water ecosystems, their composition and components;

conformities to the law of functioning of biotic and abiotic components of water ecosystem are under act of anthropogenic and natural impacts;

basic problems of superficial water ecosystem are in Ukraine;

methods of estimation of the state and maintenance of wetlands;

methods of improvement of the state of water ecosystems;

principles and methods to conducts of wetlands hydrological monitoring of wetlands about consisting of biodiversity of water ecosystems in Ukraine and methods of organization of network of ecological corridors which include hydrogen's of ecosystems;

existing in Ukraine legislative and normatively - methodical base from the maintenance of water ecosystem.

As a result of study of discipline a student *must be able*:

to analyze the problems of functioning and estimate the state of water ecosystem; to develop the plans of complex measures on a maintenance and recreation of the state of different types of water ecosystem;

to plan organizational measures for the conduct of ecological - hydrological monitoring and form the plans of conduct of necessary supervisions on the state water ecosystem;

on the maps of land and water use of territories of different level to select on territories and in the places of location of water ecosystem of placing of ecological corridors; to estimate the terms of existence of water ecosystem and estimate accordance them existent legislation and normativno- to the methodical base from the maintenance of water ecosystems.

A list of courses, mastering of which is required for studying the subject.

Per-course for studding Water Ecosystems is a Hydrology and Hydroecology.

Courses, mastering of which is required for studying the subject are Water Management, Environmental Review.

3. PROGRAM AND STRUCTURE OF THE SUBJECT

Назви змістових модулів і тем	Кількість годин											
	денна форма						Заочна форма					
	усього	у тому числі					усього	у тому числі				
		л	п	лаб	інд	с.р.		л	п	лаб	інд	с.р.
1	2	3	4	5	6	7	8	9	10	11	12	13
Змістовий модуль 1. Functioning of water ecosystems.												
Тема 1. Aquatic ecosystems. Types of Aquatic Ecosystems, their functioning in natural and anthropogenic conditions.		2	2									
Тема 2. Abiotic and biotic components of aquatic ecosystems.		2	2									

Тема 3. Ecological zonation of aquatic ecosystems.		2	2									
Разом за змістовим модулем 1		6	6									
Змістовий модуль 2. Water ecosystems of Ukraine.												
Тема 1. Evtrofication		2	2									
Тема 2. State of lakes ecosystems.		2	2									
Тема 3. State of Dniper's river and Black Sea ecosystems.		2	2									
Тема 4. State of wetlands.		2	2									
Разом за змістовим модулем 2		8	8									
Змістовий модуль 3. Human impact on water ecosystems.												
Тема 1. Anthropogenic influence on aquatic ecosystems.		2	2									
Тема 2. Protection and conservation of aquatic ecosystems.		2	2									
Тема 3. Principles of ecological monitoring.		2	2									
Разом за змістовим модулем 3		6	6									
Усього годин		20	20									

4. Теми практичних занять

№ з/п	Назва теми	Кількість годин
1	Research methods of abiotic and biotic components in aquatic ecosystems. Physical and chemical characteristics of water.	2
2	Assessment of the state of aquatic ecosystems.	2
3	Determination of contamination level of different types of aquatic ecosystems.	2
4	Development of complex measures for the improvement of aquatic ecosystems states.	2
5	Management of aquatic ecosystems states and water quality within regulated parts of the rivers.	2
6	Evaluation of state and development of the measures for protection of the wetlands.	2
7	Measures of maintenance of aquatic ecosystems biodiversity.	2
8	Development of plan for the conducting of hydro- ecological monitoring.	2
9	Forming of network on ecological river corridors in Ukraine.	2
10	International collaboration in the maintenance of aquatic ecosystems.	2

5. CONROL TASKS FOR STUDENTS (EXAMPLES):

Question: Evaporation pans provide an approximate measure of

a. actual evapotranspiration
b. actual evaporation
c. potential evapotranspiration
d. actual transpiration

Correct answer: (c)

Question: If continuous water-level measurements and a stage-discharge rating are used to monitor streamflow discharge, which of the following factors would not change the stage-discharge rating?

a. ice formation
b. rock ledge
c. gravel riffle
d. aquatic vegetation

Correct answer: (b)

Question: Best Management Practices (BMPs)

a. were originally authorized in the 1948 Water Quality Act
b. are approved by the Corps of Engineers
c. are often a combination of land use controls and engineering applications
d. are primarily aimed at reducing point sources of pollution

Correct answer: (c)

Question: Which of the following constituents found in ground water is most likely associated with agricultural land use?

a. Nitrate
b. Sulfate
c. Arsenic
d. Chromium

Correct answer: (a)

Question: Which isotopes can be used for dating of:
a) young
b) older groundwaters from the Holocene period
c) What is the "key" aspect that makes the isotope that you probably chose to answer question

Question: A groundwater sample has a very low electrical conductivity.
What would be a typical **range** for "low electrical conductivities" in natural groundwaters[use an appropriate unit].
Question: A groundwater sample is rich in iron (Fe^{3+}). What does this tell you about the general hydrochemical conditions of the groundwatersystem the sample was taken from?

Question: This semester we have studied the water balance at the land surface and the flow of water and the transport of constituents through the landscape. For each of the following topics I want you to identify the most important equation or principle that we studied. In each case, write the equation or

define the principle and state briefly why you selected this equation or principle instead of alternatives that you might have chosen.

- Hydrologic cycle, control volumes, hydrologic system
- Continuity and momentum
- Energy balance, atmospheric circulation, water vapor flow
- Precipitation formation and measurement
- Evaporation
- Infiltration and soil water movement
- Transport of chemicals and sediment
- Storm runoff
- Groundwater flow
- Flow in rivers
- Nonpoint source pollution
- Map-based hydrologic modeling

Question: Select a particular geographic area with which you are familiar and pose a hydrologic problem that you wish to solve concerning that area. Try to make your problem as realistic as possible.

- Draw a sketch of the area.
- Define the problem that you wish to solve.
- Specify the important variables in your problem and the spatial and temporal domain of your solution. How many values of these variables are going to be determined at what spatial locations and at what points in time?
- What equations or methods are you going to use to solve your problem?
- How will you determine the values of the physical parameters required by these equations or methods?
- Present the solution to the problem. If you need to make up some synthetic input data to make the solution realistic, do so.
- Make an assessment of your solution. What are its limitations and weaknesses? If you were working as an engineer in a normal professional environment, how would you improve your solution?

6. Teaching Methods

A **teaching method** comprises the principles and methods used for teaching. Commonly used teaching methods for studying subject Water Resources Management include class participation, demonstration, recitation, memorization, or combinations of these. The choice of teaching method or methods to be used depends largely on the information or skill that is being taught, and it may also be influenced by the aptitude and enthusiasm of the students.

Explaining, or lecturing, is the process of teaching by giving spoken explanations of the subject that is to be learned. Lecturing is often accompanied by visual aids to help students visualize an object or problem.

Demonstrating is the process of teaching through examples or experiments. For example, a science teacher may teach an idea by performing an experiment for students. A demonstration may be used to prove a fact through a combination of visual evidence and associated reasoning.

Demonstrations are similar to written storytelling and examples in that they allow students to personally relate to the presented information. Memorization of a list of facts is a detached and impersonal experience, whereas the same information, conveyed through demonstration, becomes personally relatable. Demonstrations help to raise

student interest and reinforce memory retention because they provide connections between facts and real-world applications of those facts. Lectures, on the other hand, are often geared more towards factual presentation than connective learning.

Collaboration allows students to actively participate in the learning process by talking with each other and listening to other points of view. Collaboration establishes a personal connection between students and the topic of study and it helps students think in a less personally biased way. Group projects and discussions are examples of this teaching method. Teachers may employ collaboration to assess student's abilities to work as a team, leadership skills, or presentation abilities.

Collaborative discussions can take a variety of forms, such as fishbowl discussions. After some preparation and with clearly defined roles, a discussion may constitute most of a lesson, with the teacher only giving short feedback at the end or in the following lesson.

Learning by teaching is the method, when students assume the role of teacher and teach their peers. Students who teach others as a group or as individuals must study and understand a topic well enough to teach it to their peers. By having students participate in the teaching process, they gain self-confidence and strengthen their speaking and communication skills.

7. Forms of Knowledge Control

The main forms of knowledge control are control at the lectures at seminars and workshops, outside the classroom, at the consultations, tests and exams.
I. Control of the lectures can be conducted as a selective oral questioning of students or tests using the previously laid material, particularly in sections of the course that are necessary for the understanding of the lecture topics, read, or to establish a degree of mastery of the material lectures (held by the manner of the late first or early second hour lectures).
Testing during lectures designed to teach students to systematic elaboration covered material and prepare for the upcoming lectures, establish the degree of assimilation theory to identify the most difficult students to read chapters from the following explanation of them. Control of the lectures has to subtract time.
By spending time to control oral examination yields control, programmable for cards.
II. Current control on practical, seminar and laboratory studies conducted to elucidate ready students for employment in the following forms:

1. Writing (45 min.) Control work.
2. Colloquium on separate sections of theoretical courses (modules or themes).

III. Credits. Some subjects (theoretical courses, practical training) is applied differential test of performance appraisal on a five point scale. In a lecture course or its individual parts, which are not accompanied by laboratory or practical classes, the teacher may conduct interviews or colloquium, offer oral or written (with tickets) questions. TeacherUseful browse the students' notes. Often, students are subject to crediting as minor, insignificant and do not give enough time to prepare for it. Of the major courses before credit of Colloquium useful.

Term papers are the product of many days of work. They include elements of scientific research. Protecting course work - a special form of offset in the commission of two or three teachers. Best of coursework submitted for scientific student conference.
IV. Examinations. Exam is the final step in the study of the whole or part of the discipline and are designed to test students' knowledge on the theory and identify the skills apply the acquired knowledge in solving practical problems, as well as independent work skills with educational and scientific literature.

8. Distribution points

In the curricula include courses in one semester lecture - 30 hours of laboratory classes - 30 hours, for a total is 67 hours (3.0 ECTS credits). After studying the discipline scheduled test. Duration of the semester - 10 weeks. According to the "Regulations on credit-modular system NUBiP education in Ukraine", approved by the university rector 03.04.2009, ranking students for academic R NR learning about a subject is given by

$$R_{НР} = \frac{0{,}7 \cdot (R^{(1)}_{ЗМ} \cdot К^{(1)}_{ЗМ} + \ ... + R^{(n)}_{ЗМ} \cdot К^{(n)}_{ЗМ})}{К_{ДИС}} + R_{ДР} - R_{ШТР},$$

де $R^{(1)}_{ЗМ}, \ldots R^{(n)}_{ЗМ}$ − ratings of content modules on a 100-point scale;

n − numbers of semantic modules;

$К^{(1)}_{ЗМ}, \ldots К^{(n)}_{ЗМ}$ − number of ECTS credits, provided a working curriculum for the respective semantic module;

$К_{ДИС} = К^{(1)}_{ЗМ} + \ldots + К^{(n)}_{ЗМ}$ − number of ECTS credits, provided a working curriculum for courses in the current semester;

$R_{ДР}$ − rating with additional work;

$R_{ШТР}$ − rating free.

The formula can be simplified if we take $К^{(1)}_{ЗМ} = \ldots = К^{(n)}_{ЗМ}$.

$$R_{НР} = \frac{0{,}7 \cdot (R^{(1)}_{ЗМ} + \ ... + R^{(n)}_{ЗМ})}{n} + R_{ДР} - R_{ШТР}.$$

Student workload for their study and learning is:

1-й модуль (R_1) – 0,5 кредита ($К_1$)

2-й модуль (R_2) – 2,5 кредита ($К_2$)

3-й модуль (R_3) – 1,0 кредит ($К_3$)

4-й модуль (R_4) – 1,0 кредит ($К_4$)

Criteria for evaluating semantic modules:

R1 has 2 practical work, self-control and work. Protection of practical work and individual work performance measured from 5 to 10 points each. Tests number 1 rated 45 to 75 points.

R2 consists of 4 practical work, self-control and work. Protection of practical work and individual work performance measured from 5 to 10 points each. Tests number 2 is estimated between 35 and 55 points each.

R3 has 2 practical work and self-control work. Protection of practical work and individual work performance measured from 5 to 10 points each. Tests number 3 is estimated from 45 to 75 points.

R4 is a practical, independent and control work. Protection of practical work and individual work performance measured from 5 to 10 points. Control of the number 4, rated 50 to 85 points each.

Rating of additional work added to the DR R R NR and can not exceed 20 points. It is determined by the lecturer and the students given the decision of the department for work that is not covered by the curriculum, but enhance the knowledge of students in the discipline.

Free $\mathbf{R_{ШТР}}$ rating is less than 5 points deducted from R and NR. It is determined by the lecturer and the decision of the Department administered to students who have learned the material semantic module late, did not adhere to schedule, missed classes and more.

2. In accordance with the above provisions and protection training course project (work) measured at 100 point scale and then converted into estimates on a national scale and scale ECTS.

For admission to a student must obtain certification of training of not less than 60% of all semantic module, and a total at least 42 points out of training.

The real rating of discipline Rdys. Determined by the formula:

$$\mathbf{R_{дис.} = R_{нр.} + R_{ат}}$$

Rating of educational work Rнп in points determined according to the number of hours - 72 under work curriculum. Form controls - test.

Certifications of the discipline, course design and teaching practices measured at 100 point scale according to ECTS (Table 1).

Table 1

ECTS Scale

Rating in "Inorganic Chemistry", points	Estimation of ECTS	National mark	
		For exam	For tesr
90 – 100	**A**	excellent	Passed
82-89	**B**	good	
74-81	**C**		
64-73	**D**	satisfactory	
60-63	**E**		
35-59	**FX**	**Unsatisfactory -** is necessary to study additionally for receiving of positive mark	Failed - is necessary to study additionally for receiving of positive mark
0-34	**F**	**Unsatisfactory** - is needed the repeated course of study	Failed - is needed the repeated course of study

9. Методичне забезпечення

1. Навчальний посібник «Водні екосистеми»/ Копілевич В.А.Прокопчук Н.М., Савченко Д.А. – К.: редакційно-видавничий центр НУБіП України, 2014. - 120 с.
2. Hydroecology and Ecohydrology: Past, Present and Future/ Paul J. Wood,David M. Hannah,Dr Jonathan P. Sadler. – England, 2007. – 431 p.

3. Методика екологічної оцінки якості поверхневих вод за відповідними категоріями. Київ, 1998.
4. Global Water Partnership. 2000. Integrated Water Resources Management. Technical Advisory Committee (TAC) Background Paper no. 4. Stockholm, Sweden.

11. Рекомендована література

Базова

1. Романенко В.Д. Основи гідроекології.К.:Обереги. 2001.-728 с.
2. Экологическая гидрология водоемов Украины/ Тымченко В.М. К.: Наук. Думка, 2006.-283 с.
3. Навчальний посібник. Гідроекологія та методи гідро екологічних досліджень / Копілевич В.А., Савченко Д.А. та ін.: К.: «Поліграф», 2012. – 153 с.

Допоміжна

1. Водний кодекс України.
2. Постанова Кабінету Міністрів України «Про затвердження порядку здійснення державного моніторингу вод» № 815 від 20 липня 1996 р.
3. Клименко М.О., Трушева С.С., Гроховська Ю.Р. Відновна гідро екологія річкових та озерних систем. Рівне: НУВГП, 2005.- 212 с.
4. Чаус Б.Ю. Изучение околоводных и водных биогеоценозов. Фитоценозы: Учеб.-практические материалы.,М: СГПИ, 2000.-201 с.

15. Інформаційні ресурси

1. http://www.tutorvista.com/biology/types-of-aquatic-ecosystems
2. **http://www.marine-conservation.org.uk/marine_ecology.html**
3. http://www.ehow.com/list_7409844_types-water-ecosystems.html Types of Water Ecosystems.
4. http://www.who.int/heli/risks/water/water/en/index.html Water, health and ecosystems.
5. http://www.ramp-alberta.org/river/ecology/factors.aspx Factors Affecting Aquatic Ecosystems.

Протокол
погодження навчальної дисципліни ***Водні екосистеми***
з іншими дисциплінами спеціальності 8.04010601 ***«Екологія та охорона навколишнього середовища»***

Дисципліна та її розділи, що передують вивченню дисципліни	Прізвище, ініціали, вчена ступінь та вчене звання викладача, що забезпечує попередню дисципліну	Підпис	Дисципліна та її розділи, в яких використовуються матеріали дисципліни	Прізвище, ініціали, вчена ступінь та вчене звання викладача, що забезпечує наступну дисципліну	Підпис
Аналітична хімія. Способи вираження концентрації	к.х.н., доц. Абарбарчук Л.М.		**Гідроекологія і методи гідроекологічних досліджень**	к.х.н., доц. Савченко Д.А..	
Хімія навколишнього середовища. Процеси нітрифікації	к.х.н., доц. Войтенко Л.В.		**Екологічна безпека водних екосистем і моніторинг**	к.х.н., доц. Лаврик Р.В.	
Гідрологія Основні поняття гідрології	к.х.н., доц. Савченко Д.А..				

Голова Вченої ради факультету

NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

DEPARTMENT OF ANALYTIC AND BIOINORGANIC
CHEMISTRY AND QUALITY WATER

SYLLABUS OF SUBJECT
"AQUATIC ECOSYSTEMS"

Faculty of Ecology and Sustainable Development
Specialty 8.04010601 – "Ecology and Environment Protection"
Masters

RATIFED
Dean
Dr.Agr.Sc., Prof._____M.M. Doliia

3 semester

"___"_ _ 2015

2015-2016 Academic year

Weeks – 10

Lectures – 20 hours

Practice lessons – 20 hours

Own Training – no

Weeks	LECTURES	Hours	Practice Lessons	Hours
1	Aquatic ecosystems. Types of Aquatic Ecosystems, their functioning in natural and anthropogenic conditions.	2	Research methods of abiotic and biotic components in aquatic ecosystems. Physical and chemical characteristics of water.	2
2	Abiotic and biotic components of aquatic ecosystems.	2	Assessment of the state of aquatic ecosystems.	2
3	Ecological zonation of aquatic ecosystems.	2	Determination of contamination level of different types of aquatic ecosystems.	2

4	Evtrofication	2	Development of complex measures for the improvement of aquatic ecosystems states.	2
5	State of lakes ecosystems.	2	Management of aquatic ecosystems states and water quality within regulated parts of the rivers.	2
6	State of Dniper's river and Black Sea ecosystems.	2	Evaluation of state and development of the measures for protection of the wetlands.	2
7	State of wetlands.	2	Measures of maintenance of aquatic ecosystems biodiversity.	2
8	Anthropogenic influence on aquatic ecosystems.	2	Development of plan for the conducting of hydro- ecological monitoring.	2
9	Protection and conservation of aquatic ecosystems.	2	Forming of network on ecological river corridors in Ukraine.	2
10	Principles of ecological monitoring.	2	International collaboration in the maintenance of aquatic ecosystems.	2
Total:	100	20		20

Lecturer **N.M. Prokopchuk**

Head of the Department

Dr.Chem.Sc., Prof. **V.A. Kopilevich**

НУБіП України **Ф-7.5-2.1.6-24**

«Бланк тестових завдань»

НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ БІОРЕСУРСІВ І ПРИРОДОКОРИСТУВАННЯ УКРАЇНИ

Факультет екології і сталого розвитку
Спеціальність 8.04010601 ”Екологія та охорона навколишнього середовища”
Форма навчання денна
Семестр 1 Курс 6
ОКР «Магістр»
Кафедра аналітичної і біонеорганічної хімії та якості води
Дисципліна: **AQUATIC ECOSYSTEMS**
Викладач доц. Прокопчук Н.М.

«Затверджую»
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Білет № 1

1. Name the following compound $CoCl_3$ using the Stock system:

(to write name)
_____

2. The relative molecular weight of Phospharus (III) Oxide is equal to:

(to write answer as figure)

3. Determine type of the next chemical reaction: $ZnCl_2 + Na_2CO_3 = ZnCO_3 + 2NaCl$:

1	RedOx;	**Answer: _____**
2	Neutralization;	
3	Double replacement;	
4	Complex formation.	

4. To point the correspondence of the oxide formulas and their chemical nature:

A.	Basic	1. B_2O_3	**Answer:**
B.	Amphoteric	2. NO	**A - _____;**
C.	Acidic	3. P_2O_3	
D.	Non-salted	4. SiO_2	**B -_____;**
		5. BaO	
		6. PbO	**C - _____;**
		7. Cl_2O	
		8. BeO	**D - _____.**

5. Note chemical formula of the Chlorate (I) acid:

1	HCl	
2	HClO	**Answer: _____**

3	$HClO_2$	
4	$HClO_4$	

6. Write a formula of acidic salt, formed in the reaction between H_2S and $Ca(OH)_2$

Answer: *(chemical formula)*_____

7. Note mathematical expression of conservation law:

1	$E=mc^2$;	**Answer:** _____
2	$P_1V_1=P_2V_2$;	
3	$V_1N_1=V_2N_2$;	
4	$M = N \cdot V \cdot E$.	

8. Indicate reactions where a pressure growth in system gives the gain in yield of reaction products (shift the equilibrium to the right): (*possible more than one true variant*)

A.	$2H_2O_{(gas)} \leftrightarrow 2H_{2\ (gas)} + O_{2\ (gas)}$	**Answer:** _____
B.	$N_{2\ (gas)} + 3H_{2\ (gas)} \leftrightarrow 2NH_{3\ (gas)}$	
C.	$CaCO_{3\ (solid)} \leftrightarrow CaO_{\ (solid)} + CO_{2\ (gas)}$	
D.	$C_{\ (solid)} + H_2O_{\ (vapor)} \leftrightarrow CO_{2\ (gas)} + H_{2\ (gas)}$	
E.	$2\ NO_{\ (gas)} + 4HI_{\ (gas)} \leftrightarrow 2\ I_{2\ (gas)} + 2H_2O_{(vapor)}$	

9. To point the correctness of the statement: Maximum valency of Sulfur is IV.

1	True	**Answer:** _____
2	False	

10. Determine compound with the most ionic bond

1	HCl	**Answer:** _____
2	KCl	
3	$CaCl_2$	
4	$AlCl_3$	

11. Put in the sentence a missing figure:

Covalent bonding is formed by two atoms with difference of electronegativity in the range

_____ - _____ units.

12. To point the correspondence of the compound formulas and type of the chemical bonding of ones: (*possible more than one true variant*)

A.	Ionic	1	Ca	**Answer:**
B.	Metallic	2	$SrCl_2$	**A -** _____;
C.	Covalent polar	3	F_2	**C -**
D.	Covalent non-polar	4	NH_3	_____;
		5	OF_2	
		6	K_3N	**B -**_____;
				D -
				_____.

13. Molar concentration of solution, contained 3,33 g of H_3PO_4 per liter, is:

Solution:

Answer: ____ M.

14. In the result of hydrolysis of Salt $Ca(NO_2)_2$ medium of solution is…

_____ (alkali or acidic or neutral)

15. Note molecular, ionic and net ionic form of the reaction between: $Al(OH)_3$ and NaOH:

:

Molecular: _____

↔_____;

Ionic: _____

↔_____;

Net ionic: _____

↔_____.

16. Calculate pH of 0,001 N NaOH.

pH = _____

17. To write the 1st step of hydrolysis in the form of molecular, ionic and net ionic reactions for salt $AlCl_3$:

Molecular: _____

↔_____;

Ionic: _____

↔_____;

Net ionic: _____

↔_____.

18. Note reaction, where Oxygen is reducting agent:

1	$4FeS_2 + 11O_2 \rightarrow 2Fe_2O_3 + 8SO_2$	**Answer:** _____
2	$2H_2 + O_2 \rightarrow 2H_2O$	
3	$2\ SO_2 + O_2 \rightarrow 2\ SO_3$	
4	$2\ F_2 + O_2 \rightarrow 2\ OF_2$	

19. Complete Redox reaction with electron balance and determine coefficients:

__ $KMnO_4$ + __ Mg + __ H_2SO_4 →	___ + ___ $\bar{e} \rightarrow$ ___	____ oxiding agent
_____	___ - ___ $\bar{e} \rightarrow$ ___	____ reducing agent

20. Determine correspondence of the biological function of the chemical elements in the alive body:

A.	Ultramicronutrient, in high concentration - toxicant	1 2	I Fe	**Answer: A - _____;**
B.	Micronutrient, in high concentration - toxicant	3 4 5	Ca Cu Si	**B -_____;**
C.	Not active	6	Se	**C - _____.**

21. The structure of the last energy level of the Halogens is:

A.	ns^2np^6;	**Answer: _____**
B.	ns^2np^5;	
C.	ns^2np^4;	
D.	$ns^2np^{0.}$	

22. The additional bonds of central atom with ligands in complex compounds are realized due to:

A.	Ionic bonding;	**Answer: _____**
B.	Covalent bonding;	
C.	Donor-acceptor covalent bonding;	
D.	Metallic bonding.	

23. Complete complexation reaction (coordination number of Co^{3+} is equal 6) and calculate sum of coefficients:

__ $CoCl_3$ + __ NH_3 (excess) → [___(___)_] ____

Sum of coefficients:____

24. As usual, central atoms in compex compounds are:

A.	s-elements;	**Answer: _____**
B.	p-elements;	
C.	d-elements;	
D.	Non-metals.	

25. Calculate equivalent mass of $H_4P_2O_7$ (M=178 g/mol) is:

E ($H_4P_2O_7$) = _____g/g-eq.

26. Note possible values of spin quantum figure m_s: _____.

27. Biological function of calcium consists in:

A.	This element is a component of chlorophyll;	**Answer: _____**
B.	This element is a component of blood gem;	
C.	This element is a component of bones and enamel;	
D.	This element is a part of adenozinetriphosphate	

	acid (ATF).	

28. What's formula determine maximum quantity of electrons on the energy level?

A.	$2n^2$;	**Answer: _____**
B.	$2(2l + 1)$;	
C.	$2(2m + 1)$;	
D.	$3(n + 1)^2$;	
E.	$2(2l + m)$.	

29. To write chemical formula of compound: Calcium Chlorate (V): Answer:_____.

30. Determine substance *X* and quantity of electrons, lost by reducing agent in reaction:

$Ag + HNO_{3\,(concentrated)} \rightarrow AgNO_3 + X + H_2O$

	X	Coefficient		**Answer:** **X -** _____, **Coefficient -** _____ .
A.	NO_2	1	2	
B.	NH_4NO_3	2	3	
C.	NO	3	5	
D.	N_2O	4	1	