

al – Farabi Kazakh national University
Faculty of chemistry and chemical technology
Department of physical chemistry, catalysis and petrochemistry

Program of final exam on discipline

TPFH 5301 «Theory and Problems of Physical Chemistry»
7M05301-Chemistry

Almaty 2022 y.

The program of final exam is composed by senior lecturer of the department of physical chemistry, catalysis and petrochemistry Supiyeva Zh.A.

Reviewed and recommended at the meeting of the department of physical chemistry, catalysis and petrochemistry

«28» September 2022 y., protocol № 3

Head of department _____ Ye.A.Aubakirov

Introduction

The form of the exam: standard, written

Exam platform: UC “Univer”

Type of exam - offline

Exam control - video cameras in the classroom and a teacher

Duration: 3 hours to answer the questions.

Topics for which assignments will be compiled

1. The role of D. Mendeleev and his scientific school in creating the theory of solutions.
2. Crystal lattice energy and various methods of detection.
3. Solvation energy and heat Born, Born-Bierrum equations and Gaber's thermodynamic cycle.
4. Theoretical and applied aspects of real and chemical energetics of solvation.
5. The modern concept of the mechanism of solution formation.
6. Thermodynamic justification of the Debye-Hückel theory from the point of view of modern electrostatic theories.
7. Application of the Debye-Hückel theory to solutions of weak electrolytes and the effect of ionic strength of solutions on the rate of ionic reactions.
8. Fundamentals of statistical thermodynamics. Characteristics of macro and micro systems. Thermodynamic probability and distribution function.
9. Distribution functions of Gibbs ensembles. Boltzmann's Law on energy distribution of molecules.
10. According to the state of the molecular compound: translational, rotational, vibrational, electronic and nuclear rotation.
11. Theoretical and applied aspects of active collision theory.
12. Theoretical and applied aspects of activated complex theory. Eyring's model.
13. Statistical and thermodynamic justification of the activated complex theory.
14. Electrochemical reaction rate. Diffusion and kinetic mode of electrochemical processes.
15. The theoretical basis of concentration and electrochemical polarization.

Rules of Exam

The student needs to come to the classroom 20 minutes before the start of the exam and prepare, to sign the attendance sheet and sit in the seat indicated on the attendance sheet. You must have an identity card or ID card, a pen, a pencil with you.

During the exam forbidden:

1. Take and open a ticket without the teacher's permission.

2. To carry unauthorized aids during the exam (cheat sheets, cell phones (turned on or off), smart watches, headphones, other electronic devices, etc.).
3. Make noise, talk, get up and leave the room.
4. Seek help from third parties.
5. Unauthorized use of books, drawings, calculators without the permission of the teacher.

Instruction for the student

Important!

1. A student who has committed a violation of any of the above requirements, which was recorded by the act, is graded “F” (“unsatisfactory”) in the discipline.
2. Opening unauthorized educational materials, electronic means of communication with the student during the exam, as well as violation of these Rules is the basis for a decision to cancel the assessment results and give an “unsatisfactory” grade, regardless of whether they were used in the exam or not.

Important!

Assessment policy:

The case – tasks consist of 3 steps and they evaluate by toughly level.

First question – 30 points	Second question – 40 points
Third question – 30 points	

Recommended literature sources for exam preparation

Educational literature: basic:

1. C.R. Metz Theory and Problems of Physical Chemistry / McGraw-Hill, 1974.
2. Clyde R. Metz Theory and Problems of Physical Chemistry / McGraw-Hill; First edition (January 1, 1976).
3. Dr. RK Gupta Problems in Physical Chemistry / JEE Main and Advanced - 518 p.
4. Kenneth Schmitz Physical Chemistry Concepts and Theory /1st Edition - November 11, 2016.
5. Оспанова А.К., Шабикова Г.Х., Сыздыкова Л.И. Физикалық химиянын теориялары мен мәселері. Алматы. 2021. с 191.
6. Г.Х. Шабикова, Л.И. Сыздыкова Современное состояние теории сольватации и растворения. Алматы. 2010.

Internet resources:

1. <http://elibrary.kaznu.kz/ru>
2. <https://www.coursera.org/learn/physical-chemistry>
3. <https://teach-in.ru/lecture/09-02-Korobov>