List of questions to the differential test

1. Concept of Biogenic Elements. Classification of Biogenic Elements. Organogens.
2. Classification of Biogenic Elements Based on the Electron Configuration of s-, p-, and d-Block Elements. Electron Configuration, Topography of Elements in the Human Body. Qualitative Reactions for Identifying cations and anions of s-, p-, and d-Elements.
3. Solubility Product. Hydrolysis of Salts.
4. Werner's Coordination Theory and Modern Concepts of Complex Compound Structures. Biological Role of Complex Compounds.
5. Classification, Nomenclature, and Isomerism of Complex Compounds. Structure of Complex Compounds. Intracomplex Compounds and Chelates. Their Medical Significance and Applications.
6. Chemical Thermodynamics and Bioenergetics. Thermodynamic Systems and the Surrounding Environment. Types and Properties of Systems.
7. Thermodynamic Process. State Functions of Systems. First Law of Thermodynamics. Thermochemistry. Hess's Law. Application of Thermochemical Calculations for the Energy Characterization of Biochemical Processes.
8. Second and Third Laws of Thermodynamics.
9. Characteristic State Functions and Thermodynamic Potentials. Gibbs-Helmholtz Equation and Its Applications in Bioenergetics. Criteria for the Direction and Limit of Spontaneous Processes in an Isolated System.
10. Reaction Rate, Methods of Expression. Rate Constant. Factors Affecting the Rate of Chemical Reactions. Molecularity and Order of Reaction. Half-Life Period.
11. Homogeneous and Heterogeneous Catalysis. Enzymatic Biochemical Processes. Factors Affecting Their Rate. Chemical Catalysts and Enzymes: Similarities and Differences.
12. Kinetics of Complex Reactions (Parallel, Sequential, Combined, Chain, Photochemical). Examples of Complex Reactions Occurring in the Body.
13. Thermodynamic Criteria for Chemical Equilibrium. Le Chatelier's Principle. Factors Affecting the Shift in Chemical Equilibrium.
14. Mechanism of Electrode Potential Formation. Electrode Potentials. Nernst Equation for Calculating Electrode Potentials.
15. Classification of Electrodes. Types of Galvanic Cells. Electrochemical Processes in Biological Systems. Potentiometry in Medicine.
16. Oxidation-Reduction Processes in Biological Systems. Oxidation-Reduction Electrodes. Electron Transport in the Mitochondrial Respiratory Chain.
17. Diffusion and Membrane Potentials. Bioelectric Potentials.
18. Solubility of Substances. Factors Affecting Solubility.
19. Methods of Expressing Solution Composition and Concentration. Types of Concentration.
20. Role of Solutions in Nature and Living Organisms. Biological Role of Solutions. Hydrates, Crystallohydrates, Crystal Water. Medical Solutions.
21. Electrolytic Dissociation Theories. Ostwald's Dilution Law. Water. Dissociation of Water. Ionic Product of Water.
22. Hydrogen Ion Concentration. pH Scale. pH Values for Different Biological Fluids in Normal Conditions. Methods for Measuring pH. Acid-Base Disorders in the Body. Alkalosis and Acidosis.
23. Colligative Properties of Solutions: Vapor Pressure, Raoult's Law, Diffusion, Fick's Law, Osmosis, and Osmotic Pressure. Van 't Hoff's Law.
24. Colligative Properties of Electrolytes and Nonelectrolytes. Differences and

Specificities. Formulas for Calculations.

25. Role of Osmosis in Biological Systems and Classification of Solutions by Osmotic Pressure. Isotonic, Hypertonic, and Hypotonic Solutions. Oncotic Pressure. Plasmolysis, Hemolysis. Cryometry, Ebulliometry, Osmometry and Their Applications in Medicine.

26. Main Types of Buffer Systems, Their Chemical Composition and Classification. Buffer Systems of Blood.

27. Buffer Action. Mechanism of Buffer Systems. Factors Affecting the pH of Buffer Systems. Formulas for Buffer System pH Calculation.

28. Quantitative Characteristics of Buffer Systems. Buffer Capacity and Factors Affecting It. Calculation of Buffer Capacity. Disruption of Acid-Base Balance in Blood.

29. Surface Phenomena. Surface Energy. Surface Tension of Liquids. Surface Activity. Factors Affecting Surface Tension.

30. Surfactants, SIC, SNC. Orientation of Surfactant Molecules in the Surface Layer. Structure and Classification of Surfactants.

31. Types of Adsorption. Adsorption at the Gas-Liquid and Liquid-Liquid Interfaces. Gibbs Adsorption.

32. Adsorption at the Gas-Solid, Solid-Liquid Interfaces: Mechanism and Patterns. Langmuir Adsorption Isotherm. Freundlich Isotherm. Structure of Biological Membranes.

33. Biological Role of Adsorption in Medical Practice. Fundamentals of Adsorptive Therapy. Role of Adsorption and Ion Exchange in Biological Processes. Adsorption Methods in Efferent Therapy.

34. Adsorption of Electrolytes. Selective Adsorption. Ion Exchange Adsorption. Specifics of Ion Adsorption.

35. Chromatography. Classification of Chromatographic Methods. Application of Chromatography in Biology and Medicine. Examples.

36. General Characteristics and Classification of Dispersed Systems.

37. Physical and Chemical Methods for Obtaining Colloidal Systems. Structure of Micelles.

38. Methods for Purifying Colloidal Solutions: Dialysis, Electrodialysis, Ultrafiltration, etc.

39. Optical, Molecular-Kinetic, and Electrical Properties of Dispersed Systems.

40. Kinetic and Aggregative Stability of Colloidal Systems. Mechanism of Electrolyte Coagulation Action. Schulze-Hardy Rule. "Colloidal Protection" Phenomenon.

41. Types of Dispersed Systems. Ultramicroscopic Heterogeneous and Coarse Dispersed Systems.

42. Polymer Solutions. Similarities and Differences between Polymer Solutions and Sols. Swelling and Dissolution of Polymers. Mechanism of Swelling. Stages of Swelling.

43. Proteins as Natural Polymers. Effect of pH on Swelling and Dissolution of Proteins. Isoelectric State of Proteins.

44. Classification of Nano-Objects. Methods of Synthesis and Properties of Nanoparticles.

45. Chemical Properties of Nanoparticles. Carbon Nanomaterials.

46. Nanoparticles and Medicine. Fullerenes. Toxicity of Nanoparticles.