MEDICAL UNIVERSITY OF PLOVDIV

FACULTY OF PHARMACY

DEPARTMENT OF CHEMICAL SCIENCES

GENERAL AND INORGANIC CHEMISTRY EXAM QUESTIONS

1. The early history of chemistry. Fundamental chemical laws. Dalton's atomic theory. Early experiments to characterize the atom.

2. The modern view of atomic structure. Quantum mechanics, Heisenberg uncertainty principle, De Broglie theory, Schrödinger equation, Quantum numbers and atomic orbitals, electron density distribution, Pauli exclusion principle.

3. Atomic structure and periodicity. Periodic trends in chemical properties of the main group elements: ionization energy, electron affinity, atomic and ionic radii, electronegativity.

4. Chemical bonding. General concepts. Types of chemical bonds. The views of Kossel and Lewis. Chemical bond characteristics.

5. VSERP model. Valence bond theory. Hybridization of atomic orbitals: Examples. Delocalized bonds.

6. Intermolecular forces. Hydrogen bonding. Crystal structure. Types of crystals.

7. Coordination compounds. General characteristics. Nomenclature. Isomerism

8. Solutions. Types of solutions. Concentrations and related quantities. Solubility.

9. Colligative properties. Vapor-pressure lowering. Boiling-point elevation. Freezing-point depression. Osmotic pressure.

10. Electrolyte solutions. Strong and weak electrolytes.

11. Acids and bases. The pH scale. Acid-base indicators. Buffer solutions.

12. Neutralization. Hydrolysis of salts – examples.

13. Colloids: classification, basic concepts and properties. Methods for preparation of hydrophobic colloids. Stability of colloidal solutions. Lyophilic colloids.

14. Hydrogen. General characteristics. Isotopes. Occurrence. Production. Properties. Compounds. Applications.

15. Alkali metals: lithium (Li), sodium (Na), potassium (K), rubidium (Rb), cesium (Cs), francium (Fr) – general characteristics. Occurrence. Production. Properties. Chemical compounds. Applications.

16. Periodic table group 2 elements (group IIA). Beryllium (Be), magnesium (Mg), calcium (Ca), strontium (Sr), barium (Ba), radium (Ra) – general characteristics. Occurrence. Production. Properties. Chemical compounds. Biological role. Applications.

17. Periodic table group 13 elements (group IIIA). General characteristics. Boron. Isotops. Properties. Occurrence. Production. Chemical compounds. Applications.

18. Aluminum, gallium, indium, thallium – general characteristics. Occurrence. Production. Properties. Chemical compounds. Applications

19. Periodic table group 14 elements (group IVA). General characteristics. Carbon – characteristics. Occurrence. Production. Allotropes. Chemical compounds. Applications.

20. Silicon, germanium, tin, and lead – general characteristics. Occurrence. Production. Properties. Chemical compounds. Applications.

21. Periodic table group 15 elements (group VA). General characteristics. Nitrogen – characteristics. Occurrence. Production. Properties. Chemical compounds. Applications.

22. Phosphorous, arsenic, antimony, bismuth – characteristics. Occurrence. Production. Properties. Chemical compounds. Applications

23. Periodic table group 16 elements (group VIA). General characteristics. Oxygen – characteristics. Occurrence. Production. Properties. Chemical compounds. Applications.

24. Sulphur, selenium, tellurium, polonium – characteristics. Occurrence. Production. Properties. Chemical compounds. Applications

25. Periodic table group 17 elements (group VIIA). Fluorine, chlorine, bromine, iodine, astatine – characteristics. Occurrence. Production. Properties. Chemical compounds. Applications.

26. Periodic table group 18 elements (group VIIIA). Helium, neon, argon, krypton, xenon, radon – characteristics. Occurrence. Production. Chemical compounds. Applications.

27. Transition metals. First-row transition metals. Second- and third-row transition metals. Characteristics. Applications.

28. Lanthanides and actinides. Characteristics. Applications.