CHEMISTRY SYLLABUS

Admission examination topics for the academic year 2018/2019
Medical University-Pleven

I. GENERAL CHEMISTRY

1. Structure of atom. Atomic nucleus. Electron shells. Quantum numbers. Atomic orbital.
2. Filling of electronic energy levels with electrons in multi-electron atoms. Ground and exited state of the atoms. Atomic and ionic radius. Ionization energy, electron affinity, electronegativity.
3. Periodic low. Periodic table of the chemical elements. Variation of properties within groups and rows.
4. Covalent chemical bond. Nature of the mechanism for formation of dative bond. Types of covalent bonds – σ- and π-bonds. Hybridization of atomic orbitals.
5. Polar and non-polar covalent bond. Types of molecules – polar and non-polar molecules. Ionic bond. Structure of ionic compound. Hydrogen bond.
6. Valence and oxidation state. Oxidation-reduction processes. Oxidation and reduction. Oxidizing and reducing agents. Balancing oxidation-reduction equations. Series of the relative activity of metals.
7. Chemical kinetics. Reaction rate of chemical reactions. Factors affecting reaction rates of chemical reactions. Rate law.
8. Temperature dependence of reaction rate. Activation energy. Catalysis.
9. Chemical equilibrium. Characteristic of chemical equilibrium. Equilibrium constant.
10. Factors affecting equilibrium – concentration, pressure and temperature effects. Le Chatelier-Brown principle.
11. Dispersions. Solutions. Dissolution. Concentration of solutions. Solubility.
12. Diffusion and osmosis.
13. Electrolytic dissociation. Arrhenius theory of dissociation. Dissociation of ionic compounds and compounds with polar molecules.
14. Weak electrolytes –ionization constant, Ostwald dilution law. Strong electrolytes.
15. Acids and bases according to the theories of Arrhenius, Brønsted-Lowry and Lewis.
16. Autoionization of water. Ion product of water. pH, methods to measure pH – indicators.
17. Salt hydrolysis. Degree of hydrolysis.
18. Coordination compounds – definition, composition, stability. Bonding in coordination compounds.
19. Colloids – definition, classification. Structure of lyophobic colloidal solutions. Properties.

II. ORGANIC CHEMISTRY

1. Carbon chains. Nature of chemical bonding in organic compounds. Hybridization of orbitals of carbon atoms.
2. Alkanes – homologues series, naming, isomerism. Preparation.
3. Alkanes – physical and chemical properties. Inductive effect.
4. Alkenes – homologues series, naming, isomerism. Preparation. Physical and chemical properties.
5. Alkynes – homologues series, naming, isomerism. Preparation. Physical and chemical properties.
6. Arenes (Aromatic hydrocarbons) - Structure of benzene ring. Nomenclature, isomerism. Preparation.

7. Arenes - Physical and chemical properties. Activating and deactivating groups in benzene ring.
8. Hydroxyl derivatives of hydrocarbons – characteristics, classification, nomenclature, isomerism. Preparation.
9. Hydroxyl derivatives of hydrocarbons – physical and chemical properties.
10. Amines – types, physical and chemical properties. Preparation.
11. Carbonyl derivatives of hydrocarbons - classification, nomenclature. Preparation.
12. Carbonyl derivatives of hydrocarbons - physical and chemical properties.
13. Carboxylic acids– characteristics, classification, nomenclature, isomerism. Preparation.
14. Carboxylic acids– physical and chemical properties.
15. Carbohydrates – characteristics and classification. Monosaccharides – types and nomenclature.
16. Glucose – composition and structure. Physical and chemical properties.
17. Fructose – composition, structure, physical and chemical properties. Ribose and 2-desoxiribose.
18. Disaccharides - characteristics and types. Saccharose – composition, structure and properties.
19. Homopolysaccharides – starch and cellulose.
20. Amino acids – characteristics and classification. Physical and chemical properties. Peptides. Biological action and importance.