



Faculty of Pharmacy

Department I

University Department Sub-Structure of General and Inorganic Chemistry

University Professor, Position 21

Topics

GENERAL CHEMISTRY

I. Structure of the atom

I.1. The atomic nucleus. Main characteristics of the atomic nucleus. Stability of the nuclides. Methods for the stabilization of the instable nuclei. Natural radioactivity.

I.2. Structure of the electron shells of atoms. The atom with many electrons. Electronic configurations.

II. Properties of the elements. Periodic system of the elements

Correlations between the electronic configuration and the position within periodic table. Variation of the properties of the elements as function of their atomic number. Periodic properties.

III. Chemical bond

III.1. Valence bond method (VBM). Hybridization of the atomic orbitals. Characterization of the covalent bond by VBM.

III.2. Molecular orbital method (MOM). Diatomic molecules of elements of 1st period. Diatomic molecules of elements of 2nd period. Polar bond and polarity of the molecules. III.3. Intermolecular bonds. Van de Waals interactions. Hydrogen bond.

IV. States of aggregation

Equilibrium phase transformation diagrams. Short characterization of gaseous phase. Short characterization of gaseous phase. Solid state. Crystalline solids. Metallic bond.

V. Chemical reactions

V.1. Chemical equilibria. Principles and applications. Introductory notions of chemical thermodynamics.

V.2. Redox reactions. Complexation reactions.

INORGANIC CHEMISTRY

VI. General properties of non-metals.

VII. Group VII_A

Natural state, obtaining, reactivity, uses. Applications of halogens in the pharmaceutical field. Halogen compounds. Halides, oxides, hydric acids and oxoacids.

VIII. Group VI_A

Natural state, obtaining, reactivity, uses. The main characteristics and properties of the compounds of the elements of the VI_A group. Physiological implications of sulfur and selenium.

IX. Group V_A

IX.1. Natural state, obtaining, nitrogen reactivity. Nitrogen compounds. Uses of nitrogen and its combinations.

IX.2. The main properties of phosphorus, arsenic, antimony and bismuth and their compounds. Physiological implications and toxicity of arsenic, antimony and bismuth.

X. Group IV_A

Natural state, obtaining, reactivity, uses. Properties of compounds of IV_A group elements. Physiological implications of the elements of the IV_A group.

XI. General properties of metals.

XII. Group III_A

Natural state, obtaining, reactivity, uses. Properties of compounds of elements of group III_A. Boron clusters.

XIII. s-Block elements.

Natural state. Obtaining, reactivity, properties and uses of the elements of the s-block. The main



properties of the combinations of alkaline and alkaline-earth elements. Diagonal relationship.

XIV. Transitional metals.

XIV.1. The main properties of copper, silver, gold and platinum and their combinations. Platinum compounds with pharmaceutical applications.

XIV.2. The main properties of iron, zinc, mercury, chromium and manganese and their combinations. Physiological implications.

XIV.3. The main properties of lanthanides and actinides. Pharmaceutical applications of lanthanides.

XV. General notions of bioinorganic chemistry.

Bibliography

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