

Alagappa University, Karaikudi - 63003

Distance Education

M. Sc., Chemistry Degree Examination

34411- Inorganic Chemistry -1

Assignment Question

1. Draw the MO energy level diagram for NO molecule predict the bond order and magnetic properties of NO^+ molecular ion.
2. Explain briefly the acid strength, of HClO_3 , HBrO_3 , HIO_3 .
3. Define the following properties and discuss their variation across a period and a group. (i) Electron affinity (ii) Electronegativity.
4. What is HSAB concept? Discuss briefly its principle, applications and limitations with suitable examples.
5. Explain Anderson and Keggin structures with suitable examples.
6. Distinguish between hexagonal close packing and cubic close packing.
7. Give the crystal structure of fluorite and CsCl .
8. Discuss any five properties of ionic compounds.
9. Discuss briefly the structure of three dimensional silicates with suitable example.
10. Discuss briefly the structure of XeF_2 , XeF_6 and XeO_3 on the basis VSEPR theory.
11. What are differentiating solvents? Why are they called so? Explain them with suitable examples.
12. Define the terms: ionic radius, ionisation potential and electron affinity. How do they vary along the groups and across the periods of periodic table?
13. Explain briefly the metal excess defect and metal deficiency defect with suitable examples.
14. Discuss briefly the structure of diamond.
15. How can Born-Haber cycle be used for calculating the lattice energy of a compound?
16. Explain the Lewis concept of acids and bases with appropriate examples.
17. Write a note on feldspar and zeolites.
18. Explain pyrosilicates and sheet silicates with neat diagrams.
19. Draw the crystal structures of NaCl and rutile. Show the coordination around each type of ion in the structures.
20. State and explain the Schottky and Frenkel defects.
21. What is lattice energy? Write down the Born-Landé's equation. How is it used for calculating the lattice energy of an ionic compound? Explain with suitable example.

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34412- Organic Chemistry -1

Assignment Question

- 1 IUPAC nomenclature of Bicyclic, polycyclic and Heterocyclic compounds
- 2 Factors affecting reaction and Mechanism
- 3 Electron delocalization and resonance -Aromatic, antiaromatic, homoaromatic and nonaromatic compounds
- 4 Molecular orbital picture of Aromaticity- HMO theory
- 5 Aromaticity on cyclopentadienyl anion, fulvene, ferrocene, azulene, tropolones, annulenes and tropylium cations.
- 6 Aromaticity on larger annulenes, hetero annulenes and fullerenes (C₆₀).
- 7 Stereoisomerism
- 8 R and S nomenclature using Cahn-Ingold-Prelog rules
- 9 diastereoisomers – constitutionally symmetrical and unsymmetrical chiral molecules - erythro, threo nomenclature – E and Z nomenclature – out/in isomers
- 10 Classification of organic reaction and Hammond postulate
- 11 Kinetic and thermodynamic control of chemical reactions - Kinetic and nonkinetic methods for determining organic reaction mechanisms
- 12 Structure and stability of carbocations, Classical and non-classical carbocations
- 13 Neighbouring group participation
- 14 Wagner-Meerwein rearrangement
- 15 Pinacol-pinacolone, semi-pinacol rearrangement
- 16 Demzonev and Wolff rearrangement
- 17 Baeyer-Villiger and Stern rearrangement
- 18 Beckmann and Favorskii rearrangements.
- 19 Aliphatic nucleophilic substitutions: S_N1 mechanisms with examples
- 20 Aliphatic nucleophilic substitutions :S_N2 and S_Ni mechanisms with examples
- 21 Aliphatic Electrophilic substitution :S_E1, S_E2 and S_Ei reaction and mechanism
- 22 Aromatic electrophilic substitution reaction: arenium ion mechanism, nitration, sulphonation and halogenation
- 23 Friedel craft alkylation and acylation
- 24 Gattermann Koch formylation -and Vilsmeier-Haas reaction & mechanism
- 25 benzyne mechanism and Von-Richter reaction.

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34413- Physical Chemistry -1

Assignment Question

1. State the second law of thermodynamics. Discuss the need of II law.
2. Define entropy. Explain the entropy change in reversible process.
3. Derive Gibbs-Helmholtz equation.
4. Derive Debye-Huckel Onsager equation.
5. Explain Butler-Volmer equation in detail.
6. Write a note on electrochemical cells.
7. Discuss the postulates of quantum mechanics in detail.
8. Give the application of quantum chemistry to particle in a one-dimensional box.
9. Explain the chemical kinetics of reversible reactions.
10. Write a note on kinetic isotopic effect.
11. Discuss the Lindmann theory of unimolecular reaction in detail.
12. Discuss the Nernst heat theorem in detail.
13. What is fugacity? How will you determine it?
14. Explain the activity and activity coefficient.
15. Explain the terms transport number and ionic mobilities.
16. Give the applications of conductivity measurement.
17. Derive Debye-Huckel limiting law.
18. Derive the Schrodinger wave equation.
19. Discuss the solar energy conversion.
20. Write a note on Flash Photolysis.