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B521

Dual Degree B.Sc. (Hons.) Chemistry-M.Sc. Chemistry EXAMINATION, 2020

(Second Semester)

(Main & Re-appear)

INORGANIC CHEMISTRY-II

DCH102

Time : 3 Hours] [*Maximum Marks : 75*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all including Q. No. **1** which is compulsory and taking *one* question from each Unit I-IV.

1. (a) How do you calculate the percentage of ionic character from dipole moment and electronegativity difference ? **3**

(b) What do you mean by hydrides ? Discuss the different types of hydrides. **4**

(c) Discuss the following :

(i) Metallurgy

(ii) Acidic flux

(iii) Amalgamation

(iv) Slag. **4**

(d) Using HSAB principle explain the following :

(i) AgI_2^- is stable but AgF_2^- is not

(ii) CsF reacts with LiI but the reverse is not true. **4**

Unit I

2. (a) What do you mean by polarizations of ions ? Explain the variation of polarisability of an anion by a given cation in period and in a group. **5**

(b) What is hydrogen bonding ? How does it affect the melting point and boiling point of the compounds ? **5**

(c) What do you understand by the band model of metallic bond ? Discuss the type of energy bands obtained in an insulator and a semiconductor. **5**

3. (a) Using Fajan's theory, explain, how does the tendency towards covalencey is dependent on ionic size and charge. Discuss the usefulness of this theory with suitable examples. **8**

(b) How does the hydrogen bond, van der Waals forces and metallic bond play an important role to explain the physical/chemical properties of compounds ? **7**

Unit II

4. (a) Examine the first and second ionization potentials of the alkaline earth metals. The second ionization energy is much larger than the first for each element. What important consequences do you expect ? **8**

(b) Describe briefly the synthesis and important features of organometallic compounds of lithium. **7**

5. (a) Describe the methods of preparation and uses of organometallic complexes of calcium and strontium. **8**

(b) Salts of barium and radium are isomorphs. Explain the theoretical reasons with examples. **7**

Unit III

6. (a) What do you understand by concentration of the ore ? Describe the various methods involved for the concentration of the ore. **8**

(b) What is an Ellingham diagram ? Write its applications with reference to pyrometallurgical process. **7**

7. (a) What do you mean by refining ? Why do we need refining process after various metallurgical processes to get the pure metal ? Discuss the various methods involved for refining process. **8**

(b) How do you get a free metal from reduction processes ? Describe the different reduction methods used to get the pure metals. **7**

Unit IV

8. (a) How will you define acids and bases on the basis of solvent system ? Discuss the effect of solvent on the strength of acids and bases. Explain, why H_2SO_4 is stronger acid than H_2SO_3 ? **8**

(b) What is Pearson's HSAB principle ? Write its limitations and uses with reference to the classification of hard acids, hard bases, soft bases and soft acids. **7**

9. (a) Discuss the Bronsted-Lowry concept for acids and bases. What are its applications and limitations ? **7**

(b) Discuss bonding in hard-hard and soft-soft interactions. Out of BCl_3 and BF_3, which is more acidic and why ? Explain. **8**