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Roll No. Exam Code : D-23

Subject Code—60465

B. Sc. EXAMINATION

(Main/Re-appear) (Batch 2019 Onwards)

(Fifth Semester)

CHEMISTRY

CCL-503(ii) Paper I

Chemistry of Main Group Elements, Theories
of Acids and Bases-I

Time : 3 Hours

Maximum Marks : 80

Note : Attempt *Five* questions in all, selecting *one* question each from Unit I-IV. Q. No. 1 is compulsory. All questions carry equal marks.

1. (a) Which should be stronger acid, HOCN and HCN ? 2
- (b) Why is NH_3 more basic than NF_3 ? 2
- (c) Name two soft acids and soft bases 2

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- (d) Why are alkali metals stored in kerosene oil ? 2
- (e) Why alkali metals act as strong reducing agents ? 2
- (f) Why sodium and potassium do not form complex ions ? 2
- (g) What is inert pair effect ? 2
- (h) What is Catenation ? 2

Unit I

- 2. (a) What are Lewis acids and Lewis bases ? How do these differ from Bronsted-Lowry concept of acids and bases ? 5½
- (b) Define acids and bases in term of Lux-Flood concept. Give its advantages. 5½
- (c) Describe in detail Pearson HSAB principle. 5
- 3. (a) How is the strength of very strong acids and bases determined ? 5½
- (b) Why the oxo-acids of phosphorus differ from oxo-acids of sulphur ? 5½

- (c) Discuss the theoretical basis of hardness and softness using HSAB principle. 5

Unit II

- 4. (a) Draw an Ellingham diagram for metal oxides and explain why, in some cases the slope line change abruptly. 5½
- (b) Describe the method of extraction of gold from its ores. 5½
- (c) Explain the process of zone refining of impure metals. 5
- 5. (a) Describe the chief modes of occurrence of metals on the basis of standard electrode potential. 5½
- (b) Explain the extraction of titanium metal by Kroll process. 5½
- (c) Explain Mond's process for purification of nickel metal. 5

Unit III

6. (a) What is Pauling scale of electronegativity? Why Pauling scale is commonly used by chemist? $5\frac{1}{2}$
- (b) Alkali metals are extremely reactive and strong reductants. Explain with reason. $5\frac{1}{2}$
- (c) Arrange the following ions in order of increasing in size. Write the reason also : O^{2-} , Cl^- , Si^{4+} , Mg^{2+} , S^{2-} , Na^+ 5
7. (a) Beryllium and Magnesium do not impart any colour to Bunsen flame? Why is it so? $5\frac{1}{2}$
- (b) What is diagonal relationship? How does Li resemble Mg? $5\frac{1}{2}$
- (c) Compare the alkaline earth metals with alkali metals with regards to the following properties : 5
- (i) Ionisation energy
- (ii) Melting and boiling point

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Unit IV

8. (a) Why the stability of peroxide and superoxide increases as the size of alkali metal ion increases? $5\frac{1}{2}$
- (b) The solutions of alkali metals in liquid ammonia are coloured and a good conductor of electricity. Why? $5\frac{1}{2}$
- (c) Draw the structure of salicylaldehyde/acetylacetonato complex of group 1 metal. 5
9. (a) What are crown ether and cryptates? Write their unique characteristics. $5\frac{1}{2}$
- (b) Solubility of sulphates of group 2 elements decreases down the group. $5\frac{1}{2}$
- (c) Write the structure of 18-crown-6. 5

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