

Subject Code—62425

B. Sc. EXAMINATION

(Main/Re-appear)

(Batch 2020 Onwards)

(Fifth Semester)

CHEMISTRY

CCL-503 (ii)

Chemistry of Main Group Elements,

Theories of Acids and Bases-I

Paper-I

Time : 3 Hours

Maximum Marks : 80

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

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P.T.O.

Unit II

4. (a) What is meant by refining of metals ?
Discuss two methods for refining of crude metals. 8

(b) Differentiate between the following terms : 8

- (i) Calcination and Roasting
- (ii) Ore and Mineral
- (iii) Gangue and Flux
- (iv) Hydrometallurgy and Pyrometallurgy.

5. (a) Explain briefly the following processes with examples used in metallurgy : 8

- (i) Mond's process
- (ii) Kroll process
- (iii) Parting process
- (iv) Cyanide process

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(b) What is an Ellingham diagram ? Explain its significance and limitations. 8

Unit III

6. (a) Discuss the periodicity in *s*- and *p*-block elements with respect to electronic configuration. 8

(b) CCl_4 does not undergo hydrolysis but SiCl_4 is easily hydrolysed. Explain. 4

(c) Carbon possesses different electronegativity in C_2H_6 , C_2H_4 and C_2H_2 . Comment. 4

7. (a) What are the two allotropic forms of carbon ? Compare their main properties. How do their structures account for their properties ? 8

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P.T.O.

1. (a) Which is stronger acid in each of the following pairs ? 2
 - (i) HBrO or HClO
 - (ii) BH_3 or $\text{B}(\text{CH}_3)_3$
- (b) Define acids and bases in terms of Lux-fluor concept. 2
- (c) Why is the froth floatation process selected for the concentration of sulphide ores ? 2
- (d) What is flux ? Give an example each of an acidic flux and a basic flux. 2
- (e) Define allotropy. 2
- (f) Why do elements of main group elements exhibit different oxidation states ? 2
- (g) Which out of the following : 2
 - (i) MgCO_3 and CaCO_3 is more stable ?
 - (ii) BaSO_4 and BeSO_4 is more soluble in water ?
- (h) What are Crown ethers ? 2

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Unit I

2. (a) What are hard and soft acids and bases ? Explain HSAB principle with suitable examples. 8
- (b) Discuss the effect of substituents on the strengths of Lewis acids and bases. 8
3. (a) Explain the following :
 - (i) HClO_4 is more acidic than H_2SO_4 .
 - (ii) CH_3F and CHF_3 react to form CH_4 and CF_4 . 6
- (b) Arrange the following in the decreasing order of basicity and explain the order : 6
 - (i) CH_3H , CH_3NH_2 and CH_3F
 - (ii) NH_3 , NH_2NH_2 and NH_2OH .
- (c) Explain solvent system concept of acids and bases. 4

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- (b) There is distinct participation of d -orbitals in π -bonding in heavier p -block elements. Illustrate with examples. 4
- (c) Why are compound containing Si-C bonds are more reactive than the compounds containing C-C bonds ? 4

Unit IV

8. (a) What are crown ethers and cryptates ? Give examples. Discuss their unique characteristics and differences between them. 8
- (b) Why are alkali metals liquid ammonia solutions coloured and paramagnetic ? 4
- (c) Why is Li_2CO_3 decomposed at lower temperature whereas Na_2CO_3 at higher temperature ? 4

9. (a) Discuss the following structures briefly : 8

- (i) EDTA complex of Ca^{2+}
(ii) Beryllium oxalate complex.

- (b) When burnt in air lithium forms normal oxide, sodium the peroxide and potassium the superoxide. Explain. 4
- (c) Arrange the following sulphates of alkaline earth metals in order of decreasing thermal stability and explain the order : 4

