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FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2023

(CBCSS)

Chemistry

CHE 1C 02—ELEMENTARY INORGANIC CHEMISTRY

(2019 Admission onwards)

Time : Three Hours　　　　　　　　　　　　　　　　　Maximum : 30 Weightage

Section A

Answer any **eight** *questions.*
Each question carries a weightage of 1.

1. Distinguish between Lewis concept and Lux-Flood concept of acids and bases.

2. Arrange the following complex species in the increasing order of acid strength and substantiate your answer.

$$\left[Cr(H_2O)_6\right]^{3+}, \left[Fe(H_2O)_6\right]^{3+}, \left[Co(H_2O)_6\right]^{3+} \text{ and } \left[V(H_2O)_6\right]^{3+}.$$

3. Arrange the different types of hydrogen atoms present in carboranes in the increasing order of acidity. Give reasons for your answer.

4. Using Wade's rule, classify the following compounds into *closo*, *nido*, *arachno* and hypo boranes :

   a) B_4H_{10} b) $C_2B_3H_5$ c) B_5H_{11} and d) $C_2B_3H_5Fe(CO)_3$

5. How does polythiazyl behave as 'one dimensional metal' ?

6. How is triphosphonitrilic chloride converted into phospham ?

7. What are super heavy elements ? How are they produced ?

8. The ratio between atoms of two radioactive elements A and B at equilibrium was found to be $3.1 \times 10^9 : 1$. If half-life period of A is 2×10^{10} years, what is the half-life period of B ?

9. Write a note on stellar energy.

10. How do carbon nanotubes differ from fullerenes ?

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Turn over

Section B

Answer any **six** *questions.*
Each question carries a weightage of 2.

11. What is Symbiosis ? Explain with examples.

12. How is S_4N_4 prepared ? Discuss its structure and properties.

13. Give an account of the classification of silicates.

14. What are Latimer and Frost diagrams ? Discuss their applications.

15. Describe the working principle of a GM counter.

16. Discuss the bottom-up and top-down approaches for the synthesis of nanomaterials.

17. Discuss the principle and applications of XPS.

18. Give an account of the synthesis and structure of $(NPCl_2)_3$.

(6 × 2 = 12 weightage)

Section C

Answer any **two** *questions.*
Each question carries a weightage of 5.

19. Discuss the HSAB concept of acids and bases. Explain with suitable examples. How this concept predicts the co-ordination of ambidentate ligands.

20. How are B- and N- substituted borazines prepared ? Give an account of the structure and bonding in borazine. Compare its reactivity with that of benzene.

21. Give an account of the heteropoly and isopoly anions of W and Mo.

22. Elaborate the principle and instrumentation of neutron activation analysis. Mention its merits and demerits.

(2 × 5 = 10 weightage)