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FINAL YEAR B.Sc. DEGREE EXAMINATION MARCH/APRIL 2005

Part III—Group (iii)—Chemistry

Paper III—INORGANIC CHEMISTRY—II

Time : Three Hours

Maximum : 60 Marks

*Answer all questions.**Answer either (a) or (b) from each question.***Section A***Each question carries 2 marks.*

1. (a) Why do lanthanides form a closely knit group with similar properties ?

Or

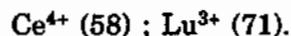
- (b) La, Gd and Lu show only + 3 oxidation state, while other lanthanides can exhibit + 2 and + 4 oxidation states. Explain.

2. (a) Complete the following reactions :

*Or*

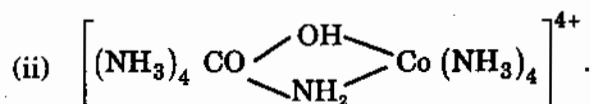
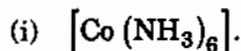
- (b) Give the general electronic configuration of actinides.

3. (a) Predict the number of unpaired electrons in the following ions :

*Or*

- (b) List the important uses of Thorium.

4. (a) Give the IUPAC names of :

*Or*

- (b) Give the structure of hemoglobin.

5. (a) Explain ionisation isomerism with an example.

Or

(b) What do you understand by stepwise and overall stability constants? How they are related?

6. (a) What is Wilkinson's catalyst? What is its use?

Or

(b) Mention two metal deficiency diseases?

7. (a) Give the autoionisation of (i) liquid SO_2 and (ii) liquid HF.

Or

(b) What do you understand by R_f value?

8. (a) How does phosphate ion interfere in qualitative cation analysis?

Or

(b) State Beers-Lambert's law.

9. (a) CuS but not ZnS is precipitated by H_2S in acid medium. Why?

Or

(b) Iodine solution is decolourised by sodium thiosulphate solution. Explain with equation.

10. (a) Ortho phosphoric acid is added during the titration of FeSO_4 against $\text{K}_2\text{Cr}_2\text{O}_7$ solution using diphenylamine as indicator. Why?

Or

(b) Explain the terms accuracy and precision.

(10 × 2 = 20 marks)

Section B

Each question carries 4 marks.

11. (a) What is lanthanide contraction? Explain its consequences.

Or

(b) Write a brief note on the colour and spectral properties of 3d elements.

12. (a) Write a note on Jahn-Teller distortion.

Or

(b) Explain with suitable example the toxicity of metal ions.

13. (a) Give the principle and applications of atomic absorption spectroscopy.

Or

(b) Discuss the principle and application of HPLC.

14. (a) Discuss the properties of ionising solvents.

Or

(b) Discuss the acid-base, metathetic and complex formation reactions in liquid SO_2 .

15. (a) Write notes on :

(i) Metallochromic indicators.

(ii) Coprecipitation.

Or

(b) Explain the various types of errors in quantitative analysis. How can errors be minimised ?

(5 × 4 = 20 marks)

Section C

Each question carries 10 marks.

16. (a) Explain the term acid rain with special emphasis to its causes, consequences and control.

Or

(b) Explain how the soil is polluted due to pesticides and long term use of artificial fertilizers.

17. (a) What is glass ? Give its composition. Describe the manufacture of glass. Give a brief account of the types of glasses.

Or

(b) Write notes on :

(i) Interhalogen compounds.

(ii) Carboranes.

(2 × 10 = 20 marks)