(7 pages)

Reg. No. : ....

Code No. : 10477 E Sub. Code : CMCH 41

B.Sc. (CBCS) DEGREE EXAMINATION,
APRIL 2024.

Fourth Semester

Chemistry — Core

INORGANIC CHEMISTRY — II

(For those who joined in July 2021–2022)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Which of the following is Lux-Flood base?

   (a) NH_3 (b) HCl

   (c) SiO_2 (d) CaO

2. Predict the colour of the alkali metal solutions in liquid NH_3

   (a) Red (b) Colourless

   (c) Green (d) Blue

3. What is the colour of Ti^{4+} ion?

   (a) Green (b) Colourless

   (c) Blue (d) Yellow

4. If one moving from La^{3+} to Lu^{3+}, the ionic radius. _____

   (a) decreases (b) increases

   (c) remains constant (d) becomes zero

5. Which of the following oil is used in Froth flotation process?

   (a) diesel (b) kerosine

   (c) coconut oil (d) pine oil

6. Which of the following is not the ore of uranium?

   (a) Pitchblende (b) Carnotite

   (c) Fergusonite (d) Pyrolusite

7. Select one of the following which is not a pseudohalogen.

   (a) Cyanogen

   (b) Thiocyanogen

   (c) Azido carbon disulphide

   (d) Iodine trichloride

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8. Predict the hybridisation involved in XeF_2

   (a) sp^2 (b) sp^3

   (c) sp^3d (d) sp^3d^2

9. Choose the formula of average deviation

   (a) $d = \sum_{i=1}^{i=N}(x_i - \bar{x})/N$

   (b) $d = \sum_{i=1}^{i=N}(x_i - \bar{x})/(N-1)^{1/2}$

   (c) $d = N \cdot \sum_{i=1}^{i=N}(x_i - \bar{x})$

   (d) $d = \sum_{i=1}^{i=N}(x_i - \bar{x})/(N-1)^2$

10. Which one of the following belongs to random errors?

    (a) instrument errors

    (b) method errors

    (c) personal errors

    (d) accidental errors whose sources cannot positively identified

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain briefly the Brownsted-Lowry theory of acids and bases with suitable examples.

    Or

    (b) Discuss any five reactions which take place in liq. HF.

12. (a) Predict the ionisation energy and complex formation reactions of d-block elements.

    Or

    (b) Discuss the spectral and magnetic properties of f-block elements.

13. (a) Write the preparation of ThO_2. Mention any three chemical properties and uses of it.

    Or

    (b) Explain the gravity separation and magnetic separation methods of concentrating ores.

14. (a) Write down the preparation of ICl_3. Predict the products when ICl_3 is heating at 68°C. What is its use?

Or

(b) How is $(SCN)_2$ prepared? Write down its reaction with KI, CuSCN and H_2S.

15. (a) Distinguish between accuracy and precision.

Or

(b) In a set of measurements, the following concentrations of Fe (ppm) were reported: 20.2, 20.4, 20.3, 20.1, 19.9, 20.0, 19.8. Calculate the average deviation from mean and standard deviation.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Explain briefly the Lewis concept and Lux-Flood concept of acids and bases with suitable examples.

Or

(b) Discuss the following reactions in liq. SO_2 giving two examples of each type.

(i) Acid-base reactions

(ii) Complex formation reaction

(iii) Precipitation reactions

(iv) Redox reactions.

17. (a) Explain the following characteristics of d-block elements.

(i) metallic character

(ii) oxidation states

(iii) reducing properties

(iv) catalytic properties

Or

(b) Discuss the following characteristics of lanthanides and actinides.

(i) Electronic configuration

(ii) Oxidation states

(iii) Colour

18. (a) State the important ores of zirconium. How is it extracted from its ore? How is it purified?

Or

(b) Write down the preparation any four properties and uses of $KMnO_4$.

19. (a) How is ClF prepared? Write down its reaction with Se, W, SO_2 and SF_4. Discuss its structure.

Or

(b) Discuss the bonding and structure of $XeOF_4$ and $XeOF_2$.

20. (a) In the analysis of an iron ore, the percentages of Fe_2O_3 were found to be 66.00, 65.55, 65.90, 67.85, 66.85, 69.90 and 65.00. The value 69.9 appears to be suspect. Ascertain whether this should be retained or rejected. The $Q_{critical}$ for 7 observations at 90% confidence level is 0.49.

Or

(b) (i) Write a note on error distribution curves. (5)

(ii) Define and explain the terms Mean, Mode and coefficient of varation. (3)