

(6 pages)

Reg. No. : .....

Code No. : 9402

Sub. Code : HCHM 42

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2015.

Fourth Semester

Chemistry

INORGANIC CHEMISTRY — IV

(For those who joined in July 2012 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

- For a  $p^2$  configuration, the term symbols are  
(a)  $^1S$ ,  $^1D$  and  $^3P$  (b)  $^2P$ ,  $^2D$  and  $^4S$   
(c)  $^2P$  (d)  $^1S$
- Ce(III) with  $4f^1$  and Yb(III) with  $4f^{13}$  configurations are colourless because they do not absorb in the  
(a) near UV region (b) far UV region  
(c) visible region (d) IR region

- Trace metal ions may be determined using \_\_\_\_\_ by employing suitable ligands.  
(a) spectrophotometer (b) fluorimeter  
(c) colorimeter (d) AAS
- $CO_2$  gas is passed through alkaline solution of a barium salt and then analysed for the barium carbonate suspension with \_\_\_\_\_.  
(a) nephelometry (b) turbidimetry  
(c) colorimetry (d) both (a) and (b)
- If the intercalation compound  $C_8K$  is heated under reduced pressure, the colour of the compound  $C_{36}K$  at the third stage is  
(a) steel blue (b) dark blue  
(c) black (d) copper coloured
- Fullerene  $C_{60}$  can behave as \_\_\_\_\_ towards transition metals.  
(a) alkane (b) alkene  
(c) alkyne (d) none of the above
- The ion  $UO_2^{++}$  is highly \_\_\_\_\_.  
(a) phosphorescent (b) fluorescent  
(c) luminescent (d) both (a) and (b)

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8. \_\_\_\_\_ should lie at relatively low energy for easily oxidizable complex.

- (a)  $\pi, \pi^*$  state                      (b)  $d - \pi^*$  state  
(c)  $d-d$  state                          (d)  $\pi - d$  state

9. \_\_\_\_\_ complexes are generally good buffers.

- (a) Magnesium                      (b) Copper  
(c) Zinc                              (d) Platinum

10. \_\_\_\_\_ and peroxidase are two heme enzymes that catalyse reactions of hydrogen peroxide.

- (a) Catalase  
(b) Superoxide dismutase  
(c) Oxidase  
(d) Mono oxygenase

PART B — ( $5 \times 5 = 25$  marks)

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

Each answer should not exceed 250 words.

11. (a) State Hund's rule explain term symbols.

Or

(b) Discuss charge transfer spectra with a suitable example.

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12. (a) What are the characteristic features of TGA and DTA curves?

Or

(b) State and explain the principle of AAS.

13. (a) Explain gel and solution method for synthesizing inorganic materials.

Or

(b) Write short notes on fullerides.

14. (a) Discuss the photochemical pathways involved in substitutional process.

Or

(b) How to store solar energy? Explain briefly.

15. (a) Explain the mechanism involved in peroxidase.

Or

(b) Write short notes on chelate therapy.

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PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) Explain the selection rules for electronic transition in detail.

Or

- (b) Write notes on XPES and discuss the chemical shifts involved in it.

17. (a) Discuss the theory and principles of DTA and DSC.

Or

- (b) Discuss the applications of colorimetry and fluorimetry.

18. (a) Write notes on :  
(i) Precipitation method and  
(ii) High temperature reactions for synthesizing inorganic materials.

Or

- (b) Describe the structure and properties of zeolites.

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19. (a) (i) Discuss the properties of excited states of metal complexes.  
(ii) Write short notes on quenching.

Or

- (b) Explain the photophysical and photochemical properties of ruthenium polypyridyls.

20. (a) Explain :  
(i) Superoxide dismutase  
(ii) Catalase.

Or

- (b) Write notes on :  
(i) Gold compounds  
(ii) Anti-arthritis agents.

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