K22P 3268

Reg. No. : .....

Name : .....

IV Semester M.Sc. Degree (C.B.S.S. – Reg./Supple./Imp.) Examination, April 2022
(2018 Admission Onwards)
CHEMISTRY
CHE 4C.11 : Inorganic Chemistry – III

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **all** questions in **one** word or **one** sentence. **Each** question carries **1** mark :

1. Among the following species which one will show EPR signal ?
   Zn^{2+}, Ti^{4+}, Mn^{2+}, Cu^{+}. Give reasons for your answer.
2. How many signals will be obtained for TMS in ^{1}H NMR ?
3. Which is least basic among the following ?
   $Al(OH)_3$, $La(OH)_3$, $Lu(OH)_3$ and $Ce(OH)_3$. Substantiate your answer.
4. What are transactinide elements ? Give an example.
5. What are eukaryotic cells ?
6. What are essential elements ? Give examples.
7. Give the structures of $Mn_2(CO)_{10}$ and $Os_3(CO)_{12}$.
8. Among the following metal carbonyls, which can be easily reduced ?
   $Ni(CO)_4$, $Fe(CO)_5$, $Cr(CO)_6$ and $V(CO)_6$. Give reasons. **(8×1=8)**

SECTION – B

Answer **any eight** questions. Answer may be **two** or **three** sentences. **Each** question carries **2** marks :

9. The C=O stretching vibrations in an aldehyde give rise to strong absorption in the IR region, while the absorption due to C=C vibration in an alkene is normally weak; why ?

P.T.O.

10. Explain the principle of photoelectron spectroscopy.

11. In potentiometric titrations, how the end point is detected ?

12. What are Latimer-Frost diagrams ? Mention their applications.

13. What is lanthanide shift reagent ? Explain.

14. Electronic spectra of lanthanide complexes are very sharp, while those of 3d metal complexes are broad; why ?

15. What is the role of metal ion in stabilizing the cell membrane ?

16. What is meant by biomineralization ?

17. Explain chelation therapy with an example.

18. State and explain EAN rule as applied to metal carbonyls.

19. How IR spectroscopy is useful in finding out the bonding mode of CO in metal carbonyls ?

20. Give an account of the classification of metal carbonyls with suitable examples. **(8×2=16)**

SECTION – C

Short paragraph questions. Answer **any four** questions. **Each** question carries **3** marks :

21. How polarographic technique can be used in quantitative analysis ?

22. Describe the principle of mass spectrometry.

23. Comment on the magnetic properties of lanthanides.

24. Compare the complex forming ability of lanthanides with that of actinides.

25. Write a note on hydrogen cycle.

26. Give a brief account of metal cyano complexes. **(4×3=12)**

SECTION – D

Essay type questions. Answer **four** questions. **Each** question carries **6** marks :

27. A) How NMR spectroscopy is useful in the structural investigation of diamagnetic metal complexes ?

OR

B) Compare the principles involved in TG and DTA. How these techniques are useful in the study of metal complexes ?

28. A) What is lanthanide contraction ? Explain its consequences and its significance in the separation of individual lanthanides.

OR

B) Describe how thorium is extracted from monazite sand ? How is it purified ?

29. A) Give an account of the structure, function and mechanism of dioxygen binding of haemoglobin and myoglobin.

OR

B) How does cis-platin act as an anticancer drug ? Why the trans isomer cannot act as an anticancer drug ? Comment on the toxic effects of cis-platin.

30. A) Give any three methods for the preparation of transition metal carbonyls. Write briefly on halogen bridged metal carbonyls.

OR

B) How metal nitrosyl complexes are prepared ? Give an account of the structure and bonding in these compounds. **(4×6=24)**
