

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 :

- Among the following species which one will show EPR signal ?
 Zn^{2+} , Ti^{4+} , Mn^{2+} , Cu^+ . Give reasons for your answer.
- How many signals will be obtained for TMS in 1H NMR ?
- Which is least basic among the following ?
 $Al(OH)_3$, $La(OH)_3$, $Lu(OH)_3$ and $Ce(OH)_3$. Substantiate your answer.
- What are transactinide elements ? Give an example.
- What are eukaryotic cells ?
- What are essential elements ? Give examples.
- Give the structures of $Mn_2(CO)_{10}$ and $Os_3(CO)_{12}$.
- 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. (3x1=3)

SECTION – B

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

- 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.

- Explain the principle of photoelectron spectroscopy.
- In potentiometric titrations, how the end point is detected ?
- What are Latimer-Frost diagrams ? Mention their applications.
- What is lanthanide shift reagent ? Explain.
- Electronic spectra of lanthanide complexes are very sharp, while those of 3d metal complexes are broad; why ?
- What is the role of metal ion in stabilizing the cell membrane ?
- What is meant by biomineralization ?
- Explain chelation therapy with an example.
- State and explain EAN rule as applied to metal carbonyls.
- How IR spectroscopy is useful in finding out the bonding mode of CO in metal carbonyls ?
- Give an account of the classification of metal carbonyls with suitable examples. (3x2=18)

SECTION – C

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

- How polarographic technique can be used in quantitative analysis ?
- Describe the principle of mass spectrometry.
- Comment on the magnetic properties of lanthanides.
- Compare the complex forming ability of lanthanides with that of actinides.
- Write a note on hydrogen cycle.
- Give a brief account of metal cyano complexes. (4x3=12)

SECTION – D

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

- 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 ?
- 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 ?
- 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.
- 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. (4x6=24)