

2125
M.Sc. Applied Chemistry (Pharmaceutical)
First Semester
Paper – 102: Inorganic Chemistry

Time allowed: 3 Hours

Max. Marks: 60

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting one question from each Unit.

x-x-x

1.	(a)	Calculate the CFSE for the d^6 high spin complex for both tetrahedral and octahedral complexes.	(2)
	(b)	What are the properties of a homogeneous catalysts?	(2)
	(c)	Consider the following radioactive decay, $^{238}\text{U}_{92} \rightarrow ^{206}\text{Pb}_{82}$, Find the total number of α -particles and β -particles.	(2)
	(d)	Draw the structure of the following molecules (i) [15]-crown-5 (ii) [2.2.2] Cryptand	(2)
	(e)	Why silicones are also referred as inorganic polymers?	(2)
	(f)	Why the lanthanoids show very few oxidation states compared to the early actinoids?	(2)
UNIT-I			
2.	(a)	Explain splitting of d-orbitals in octahedral field and calculate the CFSE.	(4)
	(b)	What is <i>Jemismno</i> rule for clusters? Explain the parameters associated with <i>Jemismno</i> rule.	(4)
	(c)	Predict the structure of (i) $\text{B}_6\text{H}_6^{2-}$ and (ii) B_5H_9 based on skeletal electron rule.	(4)
3.	(a)	Why 3d metal tetrahedral complexes are nearly always high-spin?	(4)
	(b)	What is pairing energy? Explain the prediction of high spin and low spin complexes based on pairing energy.	(4)
	(c)	What is capping principle for clusters? Explain with suitable example.	(4)
UNIT-II			
4.	(a)	How will you synthesize π -allyl complexes of transition metals? Discuss their structural and bonding aspects.	(4)
	(b)	What do you understand by homogeneous catalyst? Explain with suitable example.	(4)
	(c)	Electronic spectra of the lanthanide complexes are associated with sharp absorption bands having weak ligand field effect. Explain the fact with suitable reasons.	(4)
5.	(a)	Discuss the homogeneous hydrogenation of alkene and ketones.	(4)
	(b)	Write a note on proximity interactions in catalyst and its importance.	(4)
	(c)	Discuss the significance of Lanthanides in catalysis and medicines.	(4)

(2)

UNIT-III			
6.	(a)	The macrocyclic effect follows the same principle as the chelate effect. Explain the fact with suitable example.	(4)
	(b)	What are cryptands? Discuss the various factors of cation selectivity in cryptands.	(4)
	(c)	Mention the various radioisotopes application of thorium-229 and iridium-192.	(4)
7.	(a)	Differentiate the structure and binding ability of crown ethers with Cryptand ligands with suitable example.	(4)
	(b)	Discuss the application of crown ether complex as phase transfer catalyst and antibiotic.	(4)
	(c)	Which type of nuclear reaction takes place in the sun?	(4)
UNIT-IV			
8.	(a)	What are nitrosyls? Discuss the structure and nature of M—NO bonding in thenitrosyls.	(4)
	(b)	What are dioxygen and dinitrogen complexes? Discuss with suitable examples.	(4)
	(c)	Discuss the allotrope of phosphorus and their applications.	(4)
9.	(a)	What are metal carbonyls? Discuss the bonding in these complexes with evidences.	(4)
	(b)	Discuss the preparation and properties of Sodium nitroprusside $\text{Na}_2[\text{Fe}(\text{CN})_5(\text{NO})]$.	(4)
	(c)	Which phosphazenes are called inorganic rubbers? Discuss the synthesis and structure of these phosphazenes.	(4)