

	<b>Sanjay Ghodawat University, Kolhapur</b> Established as State Private University under Govt. of Maharashtra. Act No XL, 2017	2017-18
FY M Sc	School of Sciences   Department of Chemistry	
CHS 504	Inorganic Chemistry - II	
<del>June 2018</del> 24th May 2018	Examination: ESE -II, Max Marks: 100, Time 3 Hr	

Instructions: 1) All Questions are compulsory.  
 10:30 AM to 1:30 PM  
 Q.1 Short answer (each one mark)

Marks CO

10

1. Identify the coordination isomers among the following pairs of complexes

CO1

- $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{Ox})_3]$  and  $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{Ox})_3]$
- $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$  and  $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$
- $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$  and  $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl}(\text{H}_2\text{O})_2^{2+}$
- $[\text{Co}(\text{NH}_3)_5\text{NO}_2]\text{SO}_4$  and  $[\text{Co}(\text{NH}_3)_5\text{ONO}]^{2+}$

2. In spectrochemical series, which one of the ligand has strong field effect  
 $\text{H}_2\text{O}$ ,  $\text{CN}^-$ ,  $\text{NH}_3$ ,  $\text{OH}^-$

CO1

3. Calculate the magnetic moment of  $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$

CO1

4. Identify the molecule with an  $18 e^-$  structure

CO1

- $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$
- $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$
- $[\text{Cr}(\text{NH}_3)_6]^{3+}$
- $[\text{Co}(\text{NH}_3)_6]^{3+}$

5. In  $\text{KMnO}_4$ ,  $\text{MnO}_4^-$  ion is deep violet in colour in solution though 'd' orbital of Mn is empty because

CO1

- a)  $\text{MnO}_4^-$  ion is covalent in nature  
 b) Electronic spectra  
 c) Charge transfer spectra  
 d) d-d transition
6. Define co-operativity effect. CO2  
 7. What is the long form of NADP? CO2  
 8. Type I copper proteins are known as \_\_\_\_ CO2  
 9. Write the names of oxygen uptake proteins? CO2  
 10. Which enzyme is essential for nitrogen fixation? CO2
- Q.2 a) Solve the following (Eight marks) 20  
 i) Explain in detail electron transport process in biological system. 8 CO2
- OR
- ii) Describe the process of photosynthesis. 8 CO2  
 b) i) Factors affecting crystal field stabilization energy? 8 CO1
- OR
- ii) Explain Metal carbonyl compounds of transition elements? 8 CO1  
 c) Solve the following (Four Marks)  
 i) Calculate R-S terms for  $\text{Ti}^{3+}$  compound? 4 CO1
- Q.3 Write note on any four (Five mark each) 20  
 a) Explain charge transfer spectra with suitable example CO2  
 b) Explain Jahn teller effect in transition compound? CO2  
 c) Copper type- I & type- II proteins CO2  
 d) Fe-S proteins CO1  
 e) Biological nitrogen fixation. CO1

- Q.4 Short answer (each one mark) 10
1. What is Vaska's compound? CO4
  2. Which is the catalyst for Zeigler-Natta polymerization reaction? CO4
  3. Draw the structure of ferrocene. CO4
  4. Give the hapticity of ligands  $-\text{CH}_3$ ,  $\text{H}_2\text{C}=\text{CH}_2$  CO4
  5. What is the actual catalyst for hydroformylation reaction? CO4
  6. What are transuranic elements? CO3
  7. What is the main ore of lanthanides? CO3
  8. Write the electronic configuration of Gd and Lu. CO3
  9. Who invented artificial transmutation? CO3
  10. Write any nuclear fission reaction. CO3
- Q.5 a) Solve the following (Eight marks) 20
- i) Explain Hydroformylation reaction with mechanism? CO4
- OR
- ii) Explain Wacker's process with mechanism in detail for aldehyde preparation. CO4
- b) i) Explain the process of extraction of uranium in detail. CO3
- OR
- ii) What are the different methods for the separation of lanthanides? CO3
- Explain any 2 in detail.
- c) Solve the following (Four Marks) CO3
- Calculate the Q value of the following reactions
- $${}_7\text{N}^{14} + {}_2\text{He}^4 \longrightarrow {}_8\text{O}^{17} + {}_1\text{H}^1$$
- ${}_7\text{N}^{14}=14.00753$ ,  ${}_2\text{He}^4=4.00387$ ,  ${}_1\text{H}^1=1.00814$ ,  ${}_8\text{O}^{17}=17.00450$

Q.6	Write note on any four (Five mark each)	20	
a)	Explain Monsanto process of acetic acid preparation?		CO4
b)	Nuclear Fusion reaction.		CO3
c)	Magnetic properties of lanthanides		CO3
d)	Explain oxidative addition of hydrogen and oxygen with proper examples?		CO4
e)	$\mu\text{-CO}[(\eta^4\text{-C}_4\text{H}_4)\text{Fe(CO)}]_2$ calculate the total electron and M-M bond of organometallic compound		CO4
Total		100	