

WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 6th Semester Examination, 2023

CEMACOR13T-CHEMISTRY (CC13)

INORGANIC CHEMISTRY-V

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

Candidates should answer in their own words and adhere to the word limit as practicable.

All symbols are of usual significance.

Answer any three questions taking one from each unit

Unit-I

1.	(a)	What are trace elements in biological systems? Why are they so called? Give names of two essential ultra trace elements.	1+1+1
	(b)	Between Hb-O ₂ and Hb which one is paramagnetic? "Both O ₂ and CO are neutral molecule but CO can destroy the normal activity of Hb" — Comment on it.	2+2
	(c)	Define facilitated diffusion in the context of ion transport across biological membrane. Why is the sodium-potassium exchange process described as sodium-potassium pump?	2+2
	(d)	Give active site structure of Cytochrome C.	2
	(e)	What are the harmful effects of arsenic in human body? Mention the method of removal by Chelation therapy.	3
2.	(a)	Describe the structure and electron-transport process of 4Fe-4S ferredoxin.	3
	(b)	Give the structural features and functions of "blue blood".	2+2
	(c)	Mention the toxic effect of lead. How Pb toxicity is removed from body?	3
	(d)	Why nature chooses Zn as hydrolytic enzymes but Fe and Cu as e-transfer enzyme in biological system?	3
	(e)	What is Wilson's disease? How it can be treated with the help of Chelation therapy?	3
		Unit-II	
2	(a)	Write a company months of fronths amountains of Co. (CO)	•
3.		Write a general method for the preparation of Co ₂ (CO) ₈ .	2
	(b)	Complete the following reactions:	4
		Ferrocene + HCHO + (CH ₃) ₂ NH \longrightarrow ? $\xrightarrow{\text{MeI}}$?	
		Ferrocene + n-C ₄ H ₉ Li \longrightarrow ? $\xrightarrow{N_2O_4}$?	

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(c) Comment on the CO stretching frequencies (ν/cm^{-1}) given below: $[Mn(CO)_6]^+$ $Cr(CO)_6$; $[Ti(CO)_6]^{2-};$ $[V(CO)_6]^-;$ CO; 2090 2000 1750 1860 2143 (d) Using 18-electron rule, predict the number of metal-metal bonds in the following $1\frac{1}{2} \times 2 = 3$ complexes. (ii) Ir₄(CO)₁₂ (i) $Rh_6(CO)_{16}$ · 3 (e) What is synthetic gasoline? How can it be synthesize using Fischer Tropsch reaction? 3 4. (a) Explain the following aspects of Zeise's salt as evident from various physical measurements: The length of coordinated olefin C-C bond is greater than the C-C bond in the free hydrocarbon. The Cl trans to ethylene has the large Pt-Cl distance than the other two Pt-Cl distance. 3 (b) Give reactions of Cp₂Fe which are similar and dissimilar to benzene. 5 (c) Suggest a suitable catalyst, show its structure and mechanism for the reaction given below: $CH_3CH = CH_2 + H_2 \longrightarrow CH_3CH_2CH_3$ (d) Magnetic moment of the complex ion, [Fe(H₂O)₅(NO)]²⁺ is 3.9 BM at room 3 temperature. Comment on the oxidation number of iron in this ion. 2 (e) Write a method for acetylation of ferrocene. **Unit-III** 5. (a) What is trans-influence? How this differs from trans effect? 1 - + 1 - -(b) How does nature of solvent affect rate of substitution reaction? (c) Carry out the following reaction by S_N2 mechanism: 3 $[Co(NH_3)_5Cl]^{2+} + OH^- \longrightarrow [Co(NH_3)_5(OH)]^{2+} + Cl^-$ 6. (a) Using Trans effect and bond strength order synthesize the following from K₂PtCl₄: 3 (i) Trans isomer of $[Pt(NH_3)(C_2H_4)Cl_2]$, (ii) Cis isomer of [Pt(NH₃)(PPh₃)Cl₂]. (b) Show the intermediate formed from an octahedral complex taking part in 3 substitution reaction following associative and dissociative mechanism.

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(c) [Ni(CN)₄]²⁻ ion is thermodynamically stable, but kinetically labile. Explain.