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Your Roll No. ....

916

B.Sc. (Hons.)/III

C

CHEMISTRY

Paper XIV

(Inorganic Chemistry - IV)

Time : 3 Hours

Maximum Marks : 38

(Write your Roll No on the top immediately on receipt of this question paper)

Question No 1 is compulsory.

Attempt five questions in all.

1. Attempt any five of the following : 5×2=10

(a) The V-C bond lengths in  $[\text{V}(\text{CO})_6]$  and  $[\text{V}(\text{CO})_6]^-$  are 200 pm and 193 pm respectively. Give reason.

(b) Why do silicones act as water repellants ?

(c) The B-N bond in borazine is less polar than what is expected on the basis of electronegativity difference.

Comment.

P.T.O.

- (d) Why do clay minerals cleave into thin sheets ?
- (e) Why is  $Zn^{2+}$  not precipitated as ZnS on passing  $H_2S$  in group II of qualitative analysis ?
- (f) Why are some metal ions essential and some non-essential in the biosystem ?
- (g) Myoglobin has greater affinity for oxygen than haemoglobin. Justify.
2. (a) What is meant by ionophores ? Explain the working of the Sodium Potassium Pump diagrammatically. 3
- (b) Urea is a base in water but an acid in liquid ammonia. Assign a reason for this. 2
- (c) Define postprecipitation and coprecipitation. 2
3. (a) Explain Synergic effect. How does it explain the formation of carbonyl complexes of transition metals in low oxidation states ? Explain by referring to MO diagram of CO. 3

- (b) Why is a drop of concentrated  $\text{HNO}_3$  added to the group II centrifugate before testing for group III cations ? 2
- (c) What are silicone rubbers ? What happens when they are heated in presence of air and absence of air ? 2
4. (a) How will you test for the following ions in presence of each other ? 4
- (i)  $\text{Cu}^{2+}$  and  $\text{Cd}^{2+}$
- (ii)  $\text{NO}_2^-$  and  $\text{NO}_3^-$
- (b) What are the special properties of zinc which make it an excellent biocatalyst ? 2
- (c) Give an example of an amphoteric reaction in liquid ammonia. 1
5. (a) Why cannot ferrocene be nitrated ? How will you prepare the nitro-derivative ? 2
- (b) Despite having similar physical properties the chemical properties of borazine and benzene are different. Illustrate with examples. 2.5
- (c) How does transferrin aid in transportation of iron ? 2.5

6. (a) Why is  $(\text{NPCl}_2)_3$  less aromatic than benzene ? 3
- (b) Why is ammonium chloride needed along with ammonium hydroxide to precipitate cations of Group III ? 2
- (c) Why are mica minerals harder than talc minerals ? 2
7. (a) Which of the following obey EAN rule (any *three*) : 3
- (i)  $\text{Co}_2(\text{CO})_8$
- (ii)  $\text{Cr}(\text{C}_6\text{H}_6)(\text{CO})_3$
- (iii)  $\text{Fe}(\pi\text{C}_5\text{H}_5)(\text{CO})$
- (iv)  $\text{Fe}(\text{CO})_2(\text{NO})_2$
- (b) What is Fuller's earth ? What are its uses ? 2
- (c) Which of the following act as acids/bases in liquid ammonia ? 2
- (i) Urea
- (ii)  $\text{PbNH}$
- (iii)  $\text{BiN}$
- (iv)  $\text{NH}_4\text{Cl}$