

2014

(November)

CHEMISTRY

(Major)

Course : 503

(Inorganic Chemistry—II)

Full Marks : 48

Pass Marks : 19

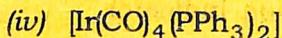
Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

1. Select the correct answer from the following :

1×5=5

(a) Vaska's compound is



- (b) The stretching wave number of the CO molecule is 2143 cm^{-1} . The C—O stretching wave number of CO in $\text{Cr}(\text{CO})_6$ is
- (i) 2160 cm^{-1}
 - (ii) 2000 cm^{-1}
 - (iii) 2260 cm^{-1}
 - (iv) 2243 cm^{-1}
- (c) Total electron count for the compound $[\text{Fe}_4\text{N}(\text{CO})_{12}]^-$ is
- (i) 60
 - (ii) 62
 - (iii) 72
 - (iv) 59
- (d) The complex $[\text{Fe}(\text{NO})_4]$ contains the ligand NO in the form of
- (i) NO
 - (ii) NO^+
 - (iii) NO^-
 - (iv) both NO^+ and NO^-
- (e) 1,10-phenanthroline iron(II) sulphate may be used as
- (i) metal ion indicator
 - (ii) adsorption indicator
 - (iii) redox indicator
 - (iv) neutralization indicator

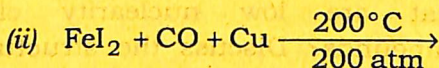
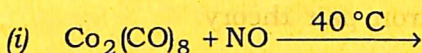
2. Answer the following questions : $2 \times 5 = 10$

(a) What is the importance of Zeise's salt in organometallic chemistry? How was it prepared? $1+1=2$

(b) Mention the conditions necessary for isolobality of two molecular fragments. 2

(c) Give a method of preparation of sodium nitroprusside. 2

(d) Complete the following reactions : $1+1=2$



(e) Define standard deviation in quantitative analysis. 2

3. Answer any *three* questions from the following : $3 \times 3 = 9$

(a) Discuss the structure of ferrocene. 3

(b) Give the reaction path of the hydrogenation of olefin with the help of Wilkinson's catalyst. 3

- (c) Explain reductive elimination reaction with suitable example. 3
- (d) Discuss the structure and bonding of mononuclear metal carbonyls. 3
- (e) How will you distinguish terminal carbonyl group from bridging carbonyl group in metal carbonyl compounds? 3

4. Answer any *three* questions from the following : 3×3=9

- (a) Outline the rules for polyhedral skeletal electron pair theory. 3
- (b) What are low nuclearity cluster compounds? Discuss the structure of $\text{Fe}_3(\text{CO})_{12}$. 1+2=3
- (c) In what ways NO can form bond with a metal? Discuss. 3
- (d) In the cluster $\text{Co}_4(\text{CO})_{12}$ —
- (i) make total electron count;
 - (ii) find the number of skeletal electron pair;
 - (iii) find the number of vertices;
 - (iv) state whether the structure will be *closo*, *nido*; or *arachno*;
 - (v) draw the structure. ($\frac{1}{2} \times 4$)+1=3

5. Answer any *three* questions from the following : 3×3=9

(a) What are determinate and indeterminate errors? Explain additive and proportional errors. 1+2=3

(b) What type of indicators will you use in the titration of (i) strong acid and weak base and (ii) weak acid and strong base? Explain giving reasons. 1½+1½=3

(c) Write a short note on adsorption indicator. 3

(d) What are metal ion indicators? Give two examples with structure. 1+2=3

6. Discuss the use of the following reagents in inorganic analysis (any *three*) : 2×3=6

(a) Benzoin- α -oxime

(b) 8-hydroxyquinoline

(c) Diphenylcarbazide

(d) 1,10-phenanthroline

(e) Magneson

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