

2015

(6th Semester)

CHEMISTRY

TENTH PAPER

Course No. : CHEM-362

(Inorganic Chemistry—III)

Full Marks : 55

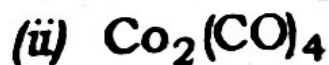
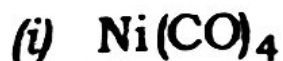
Time : 2½ hours

(PART : B—DESCRIPTIVE)

(Marks : 35)

The figures in the margin indicate full marks for the questions

1. (a) Describe the structure and modes of bonding in the following : 2+2=4



(b) Write a short note on 'organometallic compounds of magnesium.' 3

OR

2. (a) What are different modes of bonding of NO in metal nitrosyls? Give appropriate example of each. 4
- (b) Describe a method of preparation and uses of organometallic compounds of tin. 3
3. (a) Compare the structural features of deoxygenated haemoglobin and oxygenated haemoglobin. 3½
- (b) What are silicones? Write some of their uses. 3½

OR

4. (a) Describe coordination around zinc ion and the function of carbonic anhydrase. 2+1=3
- (b) What are phosphazines? Mention one method of preparation of phosphazines. 2
- (c) Discuss the structure of $(\text{PNCI}_2)_3$. 2
5. (a) What are lanthanides? Discuss briefly the following properties of lanthanides : 2
- (i) Electronic configuration
- (ii) Colour of tripositive ions

(b) How do you separate lanthanides by ion-exchange method? 2

(c) Point out similarities between lanthanides and actinides. 3

OR

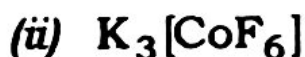
6. (a) Mention any two consequences of lanthanide contraction. 2

(b) Mention any two uses of lanthanides and their compounds. 2

(c) Describe the tendency of complex formation in actinides. 3

7. (a) Draw plots of magnetic susceptibility vs. temperature in case of paramagnetic and ferromagnetic compounds and explain the difference. 3

(b) Explain the magnetic behaviour of the following compounds : 2×2=4



OR

8. (a) What is magnetic susceptibility? How do you deduce magnetic moment from magnetic susceptibility? 1+3=4

(b) Write Curie's law and Curie-Weiss law. Explain the improvement incorporated in Curie-Weiss law over Curie's law.

3

9. (a) Discuss the conditions required for a molecule to be IR active.

4

(b) Illustrate in brief about Raman effect using a suitable energy-level diagram.

3

OR

10. (a) Predict the number of normal vibrational modes for a CO_2 molecule and mention whether they are IR active.

3

(b) Discuss the Raman spectra of—

(i) CO_2 ;

(ii) N_2O .

2+2=4

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(**Inorganic Chemistry—III**)

(PART : A—OBJECTIVE)

(Marks : 20)

The figures in the margin indicate full marks for the questions

SECTION—A

(Marks : 5)

Put a Tick (✓) mark against the correct answer in the brackets provided for it :

1×5=5

1. Which of the following is a π -acid ligand?

(a) NH_3 ()

(b) CO ()

(c) F^- ()

(d) Ethylene diamine ()

2. The paramagnetism in substances

- (a) is independent of temperature and strength of magnetic field ()
- (b) shows large decrease below Curie temperature ()
- (c) varies inversely with temperature and independent of the strength of magnetic field ()
- (d) None of the above ()

3. Which of the following is not an organometallic compound?

- (a) CH_3MgBr ()
- (b) $(\text{C}_2\text{H}_5)_4\text{Pb}$ ()
- (c) $(\text{CH}_3)_3\text{SnX}$ ()
- (d) $\text{Al}(\text{OC}_2\text{H}_5)_3$ ()

4. The most stable oxidation state of lanthanides is

- (a) +1 ()
- (b) +2 ()
- (c) +3 ()
- (d) +4 ()

5. Haemoglobin

- (a) acts as an oxygen carrier ()
- (b) contains Mg ()
- (c) contains both Mg and Fe ()
- (d) None of the above ()

SECTION - B

(Marks : 15)

Answer the following questions :

3×5=15

1. Mention the uses of organometallic compounds.

2. Discuss the importance of Na^+ and K^+ ions in the biochemical processes.

3. How can you differentiate a diamagnetic material from an antiferromagnetic material?

4. Write a note on synergic bonding.

5. Differentiate between Raman spectroscopy and Infrared spectroscopy. Discuss it with example.

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