

2017

( 6th Semester )

CHEMISTRY

TENTH PAPER

(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 bonding in metal carbonyl compounds. 3
- (b) Write a note on organometallic compounds of boron. 4

OR

2. (a) What are different modes of bonding of NO in metal nitrosyls? Give appropriate example of each. 4

- (b) Give a brief account of bonding in  $\pi$ -metal alkenyl complexes. 3

3. (a) What is cooperative effect in hemoglobin? Explain. 3

- (b) Write the general properties of inorganic polymers. 2

- (c) Explain the role of  $Mg^{2+}$  and  $Ca^{2+}$  in biological process. 2

OR

4. (a) What are phosphazines? Discuss the preparation and structure of polyphosphonitrilic chlorides. 1+3=4

- (b) Discuss briefly the role of myoglobin and hemoglobin in biological system. 3

5. (a) Mention any three consequences of lanthanide contraction. 3

- (b) Write a note on oxidation state of actinides. 2

- (c) Write a note on colour of  $M^{3+}$  lanthanide ions. 2

( 3 )

OR

6. (a) Describe the method of separation of lanthanides. 3  
(b) Compare the lanthanides and actinides in terms of their oxidation state and magnetic properties. 2+2=4

7. (a) Write a note on spin magnetic moment. 3  
(b) Explain why  $[\text{Co}(\text{NH}_3)_6]^{3+}$  is diamagnetic while  $[\text{CoF}_6]^{3-}$  is paramagnetic. 4

OR

8. (a) Draw plots of magnetic susceptibility versus temperature in case of paramagnetic and ferromagnetic compounds, and elaborate the difference. 3  
(b) Write short notes on the following : 2+2=4  
(i) Permeability  
(ii) Intensity of magnetization

9. (a) Discuss the IR spectra of bridged metal-halogen bond. 4  
(b) Predict the number of normal vibrational modes for  $\text{CO}_2$  molecule and mention whether they are IR active or Raman active. 3

( 4 )

OR

10. (a) Discuss Raman effect in brief. 3  
(b) How does the hydrogen bonding affect the stretching frequencies in IR spectra? 2  
(c) The IR spectra for *trans*- $[\text{Pd}(\text{NH}_3)_2\text{Cl}_2]$  and *cis*- $[\text{Pd}(\text{NH}_3)_2\text{Cl}_2]$  show the following  $\nu_{(\text{Pd}-\text{N})}$  and  $\nu_{(\text{Pd}-\text{Cl})}$  vibrational frequencies (in  $\text{cm}^{-1}$ ) :

	$\nu_{(\text{Pd}-\text{N})}$	$\nu_{(\text{Pd}-\text{Cl})}$
<i>trans</i> - $[\text{Pd}(\text{NH}_3)_2\text{Cl}_2]$	496	333
<i>cis</i> - $[\text{Pd}(\text{NH}_3)_2\text{Cl}_2]$	495 ; 476	327 ; 306

Explain. 2

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**Subject Code : CHEM/VI/10**

**Booklet No. A**

Date Stamp .....

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**To be filled in by the Candidate**

DEGREE 6th Semester  
(Arts / Science / Commerce /  
..... ) Exam., **2017**

Subject .....

Paper .....

**INSTRUCTIONS TO CANDIDATES**

- 1. The Booklet No. of this script should be quoted in the answer script meant for descriptive type questions and vice versa.**
- 2. This paper should be ANSWERED FIRST and submitted within 45 minutes of the commencement of the Examination.**
- 3. While answering the questions of this booklet, any cutting, erasing, over-writing or furnishing more than one answer is prohibited. Any rough work, if required, should be done only on the main Answer Book. Instructions given in each question should be followed for answering that question only.**

**To be filled in by the Candidate**

DEGREE 6th Semester  
(Arts / Science / Commerce /  
..... ) Exam., **2017**

Roll No. ....

Regn. No. ....

Subject .....

Paper .....

Descriptive Type

Booklet No. B .....

*Signature of  
Scrutiniser(s)*

*Signature of  
Examiner(s)*

*Signature of  
Invigilator(s)*

**/421**

**CHEM/VI/10**

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( 6th Semester )

**CHEMISTRY**

TENTH PAPER

(CHEM-362)

**( 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 : 1×5=5

**1.** In hemoglobin and myoglobin, iron is present as

(a) Fe(II)            (    )

(b) Fe(III)           (    )

(c) Fe(IV)           (    )

(d) Fe(VI)           (    )

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( 2 )

**2.** How many fundamental vibrational frequencies can be observed in the infrared absorption spectrum of water?

(a) 6 ( )

(b) 5 ( )

(c) 4 ( )

(d) 3 ( )

**3.** The most common oxidation state in actinides is

(a) +2 ( )

(b) +3 ( )

(c) +4 ( )

(d) +5 ( )

**4.** Which of the following is not an organometallic compound?

(a)  $\text{CH}_3\text{Na}$  ( )

(b)  $\text{Ph}_3\text{C}^-\text{Na}^+$  ( )

(c)  $\text{C}_2\text{H}_5\text{Na}$  ( )

(d)  $\text{CH}_3\text{MgBr}$  ( )

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( 3 )

5.  $[\text{Fe}(\text{CN})_6]^{3-}$  and  $[\text{Fe}(\text{CN})_6]^{4-}$  are

- (a) paramagnetic ( )
- (b) diamagnetic ( )
- (c) inner orbital complex ( )
- (d) outer orbital complex ( )

( 4 )

SECTION—B

( Marks : 15 )

Answer the following questions :

3×5=15

1. Discuss the conditions required for a molecule to be IR active.

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( 5 )

2. Write a note on ferromagnetism and anti-ferromagnetism.



( 6 )

3. Discuss the ability of complex formation of actinides.

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( 7 )

4. Write a short note on the function of carbonic anhydrase in biological system.

( 8 )

5. Write one preparation and one application of alkyl magnesium halide.

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