



THE OPEN UNIVERSITY OF SRI LANKA  
B.Sc/B.Ed DEGREE PROGRAMME - 2013/2014  
Level 4 - CMU2122/CME4122  
INORGANIC CHEMISTRY  
ASSIGNMENT TEST I (NBT)

2<sup>nd</sup> March 2014 (Sunday)

Duration: 1 hour

11.00 – 12.00 noon.

**Answer all questions**

Select the most correct answer to each question given below and mark a cross **X** over the answer on the **given answer sheet**. Any answer with more than one **X** will not be counted.

1. Consider the following ligands/ions.

(a) methyl                      (b) bromide                      (c)  $\text{ox}^{2-}$

The **monodentate** ligand/s is/are

- 1) (b) only                      2) (a) & (b) only                      3) (a) & (c) only  
4) (b) & (c) only                      5) (a), (b) & (c)

2. The IUPAC name of the complex  $[\text{FeBr}_3(\text{CO})(\text{NH}_3)_2]$  is

- 1) Diamminetribromocarbonylferrate(III)  
2) Tribromocarbonyldiammineiron(III)  
3) Diamminetribromocarbonyliron(II)  
4) Diaminetribromocarbonyliron(III)  
5) Diamminetribromocarbonyliron(III)

3. What is the most likely **geometry** of  $[\text{Co}(\text{gly})(\text{ox})(\text{CO})]$ ? (gly = glycinate ; ox = oxalate)

- 1) Trigonal planar                      2) Square planar                      3) Tetrahedral  
4) Square pyramidal                      5) Octahedral

4. What is the **coordination number** of Co in  $[\text{Co}(\text{gly})(\text{ox})(\text{CO})]$

- 1) +2                      2) 4                      3) 5                      4) 6                      5) +3

5. Predict the spin only **magnetic moment** of the complex  $[\text{Fe}(\text{H}_2\text{O})_6]\text{Cl}_2$ . Water is a **weak ligand** and  $\mu = [n(n+2)]^{1/2}$  B.M. (Atomic number of Fe = 26)

- 1) 1.73                      2) 2.83                      3) 3.88                      4) 4.89                      5) 5.91

6. Which of the following statements is **true** about *mer,trans*- $[\text{FeBr}_3(\text{CO})(\text{NH}_3)_2]$ ?

- 1) Two of the three Br ligands are *trans* to each other.  
2) This complex does show optical isomerism.  
3) The molar conductivity of this complex is not zero.  
4) The primary valency of Fe is 6.  
5) The secondary valency of Fe is 3.

7. Consider the following statements.

- (a) CO is a  $\pi$ -acceptor.
- (b) Back donation increases the electron density at the metal centre.
- (c)  $\sigma$ -donors can be called as Lewis bases.

The **correct** statement/s is/are

- 1) (a) only
- 2) (a) and (c) only
- 3) (b) and (c) only
- 4) (a) and (b) only
- 5) (a), (b) and (c)

8. Pick the **correct** statement from the following statements about  $[\text{Fe}(\text{H}_2\text{O})_6]\text{Cl}_3$  which is **paramagnetic**. Water is a weak field ligand.

- 1) Its CFSE is zero.
- 2) Oxidation state of Fe is +2.
- 3) It is a low-spin complex.
- 4) It is an inner-orbital complex.
- 5) Hybridization of the metal centre is  $d^2sp^3$ .

9. Consider the following statements regarding the **diamagnetic** complex  $[\text{CoCl}(\text{NH}_3)_3]\cdot\text{H}_2\text{O}$ .

- (a) Oxidation and coordination numbers of Co are +1 and 4, respectively.
- (b) The hybridization of cobalt in this complex is  $dsp^2$ .
- (c) This shows square planar geometry.

The **correct** statement/s is/are,

- 1) (b) only
- 2) (a) & (c) only
- 3) (b) & (c) only
- 4) (a) & (b) only
- 5) (a), (b), & (c)

10. Consider the following statements about the complex  $[\text{M}(\text{H}_2\text{O})_x]^{n+}$ .

- (a) Water molecules act as ligands by donating lone pair electrons to the metal.
- (b) x is the coordination number of M and n+ is the oxidation number of M.
- (c) The rate of exchange of water molecule in  $[\text{M}(\text{H}_2\text{O})_6]^+$  is faster for Li than K.

The **correct** statement/s is/are

- 1) (b) only
- 2) (a) & (c) only
- 3) (b) & (c) only
- 4) (a) & (b) only
- 5) (a), (b), & (c)

11. The number of **geometric** isomers of the complex  $[\text{FeBr}_3(\text{NH}_3)_3]$  are,

- 1) 6
- 2) 5
- 3) 4
- 4) 3
- 5) 2

12. Pick the **correct** statement from the following statements about  $[\text{CoF}_6]^{3-}$ .

It is a **paramagnetic** complex anion.

- 1) Hybridisation of  $\text{Co}^{3+}$  is  $sp^3d^2$
- 2) It is an inner-orbital complex
- 3) It is a low-spin complex
- 4) Fluoride is a strong field ligand
- 5) IUPAC name is hexafluorocobalt(III)

13. Which one of the following complexes would give the **lowest** molar conductivity measurement?

- 1)  $[\text{FeCl}(\text{CO})_5]\text{Cl}_2$
- 2)  $[\text{FeCl}_3(\text{CO})_3]\cdot 2\text{H}_2\text{O}$
- 3)  $[\text{Fe}(\text{H}_2\text{O})_2(\text{CO})_4]\text{Br}_3$
- 4)  $[\text{Pd}(\text{CO})_4][\text{PdCl}_4]$
- 5)  $[\text{FeCl}_2(\text{CO})_4]\text{Cl}$

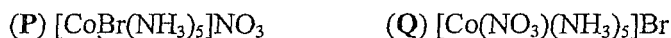
14. Consider the following statements.

- (a)  $\text{Fe}^{2+}$  forms less stable compounds than  $\text{Fe}^{3+}$ .
- (b) CFSE of  $[\text{Co}(\text{CN})_6]^{3-}$  is lower than that of  $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$ .
- (c) Larger the  $\beta$  value higher the thermodynamic stability of the complex.

The correct statement is/are

- 1) (b) only
- 2) (b) & (c) only
- 3) (a) & (c) only
- 4) (a) & (b) only
- 5) (a), (b), & (c)

15. Consider the statements (a), (b) and (c) regarding the two compounds (P) and (Q) given below.



- (a) (P) shows ionization isomerism.
- (b)  $\text{AgNO}_3$  can be used to distinguish (P) from (Q).
- (c) (Q) shows linkage isomerism.

The correct statement/s is/are

- 1) (b) only
- 2) (a) and (c) only
- 3) (a) and (b) only
- 4) (b) and (c) only
- 5) (a), (b) and (c)

16. How many unit cells in a crystal lattice share the atom marked by the filled circle in the diagram below?



- 1) one
- 2) two
- 3) four
- 4) eight
- 5) six

17. Select the **incorrect** statement from the following statements.

- 1) Molecules or atoms in a molecular solid are held together through intermolecular forces.
- 2) Metallic solids have an atom in each point of the crystal lattice.
- 3) Ionic solids have one formula unit in each point of the crystal lattice.
- 4) Atoms in a covalent-network solid are connected through a network of covalent bonds.
- 5) Solid Potassium chloride does not conduct electricity.

18. The unit cell produced as a result of packing of copper atoms through ABABA...Stacking of copper atoms is

- 1) Face centred cubic
- 2) Hexagonal
- 3) Body centred cubic
- 4) Primitive
- 5) Rhombic

19. A given sample of element having bcc structure has  $12.08 \times 10^{23}$  unit cells. The number of atoms in the sample is

- 1)  $12.08 \times 10^{23}$
- 2)  $24.16 \times 10^{23}$
- 3)  $48.38 \times 10^{23}$
- 4)  $12.08 \times 10^{22}$
- 5)  $20.00 \times 10^{23}$

20. Consider the following statements regarding a chemical defect in a crystal
- (a) composition of the lattice is changed due to new chemicals incorporated.
  - (b) ruby is an example of a crystal lattice with chemical impurity.
  - (c) crystal colour may be due to the incorporation of transition metal ions.

The correct statement/s is/are

- 1) (a) only
  - 2) (a) and (b) only
  - 3) (a) and (c) only
  - 4) All (a), (b) and (c)
  - 5) none of (a), (b) or (c)
21. Repeatable entity of a crystal structure is known as
- 1) Crystal
  - 2) Lattice
  - 3) Unit cell
  - 4) Miller indices
  - 5) interstitial atom
22. Which of the following can be stated as a line imperfection?
- 1) Schottky defect
  - 2) Frenkel defect
  - 3) Edge dislocation
  - 4) F-centre
  - 5) K-centre
23. The number of nearest neighbours for an atom in a closest packed crystal structure is
- (1) sixteen
  - (2) twelve
  - (3) eight
  - (4) four
  - (5) six
24. *Schottky-defect* in a potassium chloride crystal can be derived through
- 1) Interstitial impurity
  - 2) Vacancy-interstitial pair of cations
  - 3) Pair of nearby cation and anion vacancies
  - 4) Substitutional impurity
  - 5) None of the above
25. In making steel, carbon atoms of a radius of 0.071 nm fit in to the interstitial spaces of closest packed structure of iron (radius 0.124 nm).
- (a) It is a case of a substitutional impurity.
  - (b) It is a case of an interstitial impurity.
  - (c) It is a case of a hole formation in the lattice of Fe.

The correct statement/s is/are

- 1) (a) only
- 2) (b) only
- 3) (b) and (c) only
- 4) (a) and (b) only
- 5) (a), (b) and (c).

THE OPEN UNIVERSITY OF SRI LANKA  
 B. Sc DEGREE PROGRAMME 2013/2014  
 CMU2122/CME4122 – INORGANIC CHEMISTRY- LEVEL 4  
 ASSIGNMENT TEST-I

MCQ ANSWER SHEET: Mark a cross (X) over the most suitable answer.

Reg. No.

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For Examiners Use

	Marks
<b>Total (%)</b>	

Marks

Correct Answers		
Wrong Answers		
Total		

- |  |   |   |   |   |   |  |   |   |   |   |   |  |   |   |   |   |   |
|--|---|---|---|---|---|--|---|---|---|---|---|--|---|---|---|---|---|
| 01. <table border="1" style="display: inline-table; text-align: center;"><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table> | 1 | 2 | 3 | 4 | 5 | 02. <table border="1" style="display: inline-table; text-align: center;"><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table> | 1 | 2 | 3 | 4 | 5 | 03. <table border="1" style="display: inline-table; text-align: center;"><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr></table> | 1 | 2 | 3 | 4 | 5 |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
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| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
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| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
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| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
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| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
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| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
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| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
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| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |

**B.Sc. Degree Program 2013/2014**  
**CMU2122/CME4122 – Inorganic Chemistry - Level 4**  
**Answers for the Assignment Test-I held on 02-03-2014**

- |         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1. (2)  | 2. (5)  | 3. (4)  | 4. (3)  | 5. (4)  |
| 6. (1)  | 7. (2)  | 8. (1)  | 9. (5)  | 10. (4) |
| 11. (5) | 12. (1) | 13. (2) | 14. (3) | 15. (3) |
| 16. (4) | 17. (3) | 18. (2) | 19. (2) | 20. (4) |
| 21. (3) | 22. (3) | 23. (2) | 24. (3) | 25. (2) |