



THE OPEN UNIVERSITY OF SRI LANKA  
B.Sc/B.Ed DEGREE PROGRAMME - 2014/2015  
Level 4 - CMU2122/CME4122  
INORGANIC CHEMISTRY  
ASSIGNMENT TEST I (NBT)

DATE: 1<sup>st</sup> February 2015 (Sunday)

4.00 p.m. – 5.00 p.m.

**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

- Consider the following ligands/ions,  
(a) carbonyl                      (b) chloride                      (c) glycinate  
The **monoanionic** ligand/s is/are  
1) (b) only                      2) (a) & (b) only                      3) (a) & (c) only.  
4) (b) & (c) only.                      5) (a), (b) & (c)
- What is the most likely **geometry** of  $[\text{CoBr}_2(\text{acac})(\text{CO})]$  ?  
(acac = acetylacetonate)  
1) Trigonal planar                      2) Trigonal bipyramidal                      3) Tetrahedral  
4) Square planar                      5) Octahedral
- The IUPAC name of the complex  $[\text{FeClBr}(\text{CO})_3(\text{NH}_3)]$  is  
1) Amminebromotricarbonylchloroferrate(II)  
2) Chlorobromotricarbonylamineiron(II)  
3) Amminebromotricarbonylchloroiron(II)  
4) Amminebromochlorotricarbonylferrus(II)  
5) Amminebromotricarbonylchloroiron(III)
- What is the **coordination number** of Co in  $[\text{CoBr}_2(\text{gly})(\text{acac})]$ .  
(acac = acetylacetonate ; gly = glycinate)  
1) +2                      2) 4                      3) 5                      4) 6                      5) +3
- Which one of the following statements is **true** about  $[\text{CoCl}_2(\text{en})_2]$ .  
1) It is a diamagnetic complex.  
2) *cis*-isomers do show optical isomerism.  
3) The molar conductivity of this complex is about  $100 \text{ m}^2 \Omega^{-1} \text{ mol}^{-1}$ .  
4) *trans*-isomer is optical active.  
5) The secondary valency of Co is 4.
- Predict  $\mu_s$  in BM of a possible **tetrahedral** complex  $\text{Na}[\text{Co}(\text{CN})_4]$ .  
Cyanide is a **strong ligand** and  $\mu_s = [n(n+2)]^{1/2}$  B.M. (Atomic no. of Co = 27)  
1) 1.73                      2) 2.83                      3) 3.88                      4) 4.89                      5) 5.91
- Which one of the following complexes would give a molar conductivity of  $250 \text{ m}^2 \Omega^{-1} \text{ mol}^{-1}$ ?  
1)  $[\text{RuBr}_2(\text{CO})_4]\text{Cl} \cdot \text{H}_2\text{O}$                       2)  $[\text{RuBr}(\text{CO})_5]\text{Br}_2$                       3)  $[\text{Ru}(\text{H}_2\text{O})_2(\text{CO})_4]\text{Br}_3$   
4)  $[\text{Pt}(\text{NH}_3)_4][\text{PtBr}_4]$                       5)  $[\text{RuBr}_3(\text{CO})_3] \cdot 2\text{H}_2\text{O}$

8. Pick the **correct** statement from the following statements about  $\text{Na}_4[\text{Fe}(\text{CN})_6]$  which is **diamagnetic**. Cyanide is a **strong ligand**.

- 1) CFSE is  $-0.4\Delta_o$ .
- 2) Primary valency of Fe is 6.
- 3) It is a high-spin complex.
- 4) It is an outer-orbital complex.
- 5) Hybridization of the iron centre is  $d^2sp^3$ .

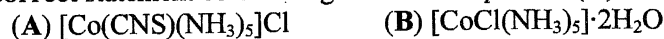
9. Consider the following statements regarding the complex  $\text{Na}[\text{Co}(\text{CO})_4]$ .

- (a) Oxidation number of Co is  $-1$ .
- (b) This shows tetrahedral geometry.
- (c) It is an 18e-complex.

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

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

10. Pick the **incorrect** statement considering the two compounds (A) and (B).



- 1) (A) shows linkage isomerism.
- 2) (B) shows hydrate isomerism
- 3) (A) shows ionization isomerism
- 4)  $\text{AgNO}_3$  can be used to distinguish (A) from (B).
- 5) The IUPAC name of (B) is pentaamminediaquachlorocobalt(I)

11. The number of **all possible geometrical** isomers of the complex  $[\text{MA}_2\text{BC}]$  are,

- 1) 4
- 2) 5
- 3) 6
- 4) 3
- 5) 7

12. Pick the **incorrect** statement from the following statements about *trans*- $[\text{CoCl}(\text{CO})(\text{NH}_3)_2]$ .

- 1) Hybridization of cobalt is  $dsp^2$ .
- 2) It is a  $d^8$  complex.
- 3) It is a diamagnetic complex.
- 4) Crystal field splitting of chloride ion is higher than that of CO.
- 5) The IUPAC name is *trans*-diamminecarbonylchlorocobalt(I).

13. Consider the following statements.

- (a) Equilibrium constants of a substitution reaction vary  $K_1 < K_2 < K_3 \dots\dots$
- (b)  $[\text{Ni}(\text{en})_2]\text{Cl}_2$  is less stable than  $[\text{Ni}(\text{NH}_3)_4]\text{Cl}_2$ .
- (c)  $\text{Log}\beta_4 = \text{Log}K_1 + \text{Log}K_2 + \text{Log}K_3 + \text{Log}K_4$

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

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

14. Consider the following ligands/ions,

- (a) sulphate
- (b) oxalate
- (c) ethylenediamine

The **possible bidentate** ligand/s is/are

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

15. The reaction,  $[\text{CoF}(\text{NH}_3)_3] + \text{NaI} \rightarrow [\text{CoI}(\text{NH}_3)_3] + \text{NaF}$  can be classified as

- 1) an insertion reaction.
- 2) an oxidative addition reaction.
- 3) a reductive elimination reaction.
- 4) a substitution reaction.
- 5) a redox reaction.

16. Which of the following statement is true?
- 1) There is no sharp melting point for amorphous solids.
  - 2) Crystalline solids do not have short – range order.
  - 3) Both crystalline and amorphous substances have regular arrangement of atoms or ions.
  - 4) There is no sharp melting point for crystalline solids.
  - 5) Both rubber and sodium chloride are amorphous substances.
17. Which of the following is a molecular crystal?
- 1) Dry ice      2) Quartz      3) Rock salt      4) Diamond      5) MgO
18. Repeatable entity of a crystal structure is known as
- 1) Crystal    2) Lattice    3) Unit cell    4) Miller indices    5) spheres
19. A compound formed by elements X and Y crystallizes in a cubic structure in which atoms X are at the corners of the cube and atoms Y are at the centre of faces. The formula of the compound is
- 1)  $X_3Y$       2)  $XY$       3)  $XY_2$       4)  $XY_3$       5)  $X_2Y$
20. Sodium chloride, NaCl usually crystallizes in a face centred cubic lattice. How many ions are in contact with any single  $Na^+$  ion?
- 1) 8      2) 6      3) 4      4) 1      5) 3
21. In the close packed crystal of compound AB. Predict the co-ordination number of  $A^+$ , if two ions  $A^+$  and  $B^-$  have radii 88 and 200 pm respectively.
- 1) 6      2) 4      3) 2      4) 8      5) 3
22. Schottky-defect in a ceramic material is best described as
- 1) Interstitial impurity
  - 2) Vacancy- interstitial pair of cations
  - 3) Pair of nearby cation and anion vacancies
  - 4) Substitutional impurity
  - 5) Point defect
23. The appearance of colour in solid alkali metal halides is generally due to
- 1) Schottky defect      2) Frenkel defect      3) Interstitial position
  - 4) F-centres      5) metal deficiency
24. How many unit cells are present in a cube-shaped ideal crystal of NaCl of mass 1.0 g? ( $Na = 23$  ;  $Cl = 35.5$  and  $L = 6.023 \times 10^{23} \text{ mol}^{-1}$ )
- 1)  $5.14 \times 10^{21}$  unit cells      2)  $1.28 \times 10^{21}$  unit cells      3)  $1.71 \times 10^{21}$  unit cells
  - 4)  $2.57 \times 10^{21}$  unit cells      5)  $21.28 \times 10^{21}$  unit cells
25. Which of the following is **not true** regarding crystalline graphite?
- 1) Each carbon atom is  $sp^2$  hybridized.
  - 2) Both covalent bonding and weak bonding is present in the structure.
  - 3) Structure consists of parallel sheets of carbon atoms.
  - 4) Each sheet consists of hexagonal array of carbon atoms.
  - 5) The unit cell is cubic.

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**B. Sc DEGREE PROGRAMME**  
**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
Total (%)	

Marks

Correct Answers		
Wrong Answers		
Total		

- |  |   |   |   |   |   |  |   |   |   |   |   |  |   |   |   |   |   |
|--|---|---|---|---|---|--|---|---|---|---|---|--|---|---|---|---|---|
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| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
| 1  | 2 | 3 | 4 | 5 |   |  |   |   |   |   |   |  |   |   |   |   |   |
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**B.Sc. Degree Program 2014/2015**  
**CMU2122/CME4122 – Inorganic Chemistry - Level 4**  
**Answers to CAT-I held on 01-02-2015**

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