



THE OPEN UNIVERSITY OF SRI LANKA  
 B.Sc. DEGREE PROGRAMME - 2019/2020  
 LEVEL 4 - CYU4300  
 INORGANIC CHEMISTRY  
 ASSIGNMENT TEST I (NBT)

DATE: 5<sup>th</sup> August 2019

4.15 p.m. – 5.15 p.m.

*Answer all questions*

Mark a cross **X** over (**English letter**) that corresponds to the most suitable answer on the **given answer sheet**. Any answer with more than one **X** will not be counted.

- Consider the following ligands/ions,  
 (i) glycinate                      (ii) carbonate                      (iii) sulphate  
 The **dianionic** ligand/s is/are  
 a) (ii) only                      b) (i) & (ii) only                      c) (i) & (iii) only.  
 d) (ii) & (iii) only.                      e) (i), (ii) & (iii)
- What is the most likely **geometry** of  $[\text{Co}(\text{CO})(\text{gly})(\text{ox})]$  ?  
 (gly = glycinate, ox = oxalate)  
 a) Trigonal                      b) Square pyramidal                      c) Tetrahedral  
 d) Square planar                      e) Answer is not given
- The IUPAC name of the complex  $\text{Na}_2[\text{Fe}(\text{CN})_2\text{Cl}_3(\text{NO})]$  is  
 a) Dicyanotrichloronitrosylferrate(III) ion  
 b) Disodium trichlorodicyanonitrosylferrate(II)  
 c) Disodium trichlorodicyanonitrosyliron(II)  
 d) Sodium dicyanotrichloronitrosylferrate(III)  
 e) Sodium trichlorodicyanonitrosylferrate(III)
- What is the **coordination number** of Fe in dicarbonylglycinatooxalatoiron(III)?  
 a) +2                      b) 4                      c) 5                      d) 6                      e) +3
- Pick the **incorrect** statement from the following statements about  $[\text{Co}(\text{NH}_3)_6]^{3+}$  of which  $\mu = 0$  BM. (Group number of Co is 9)  
 a) Hybridization of cobalt ion is  $d^2sp^3$ .  
 b) It is an inner-orbital complex.  
 c) It is a high-spin complex.  
 d) It is a diamagnetic complex.  
 e) Here  $\text{NH}_3$  acts as a strong field ligand.
- Consider the following statements regarding the complex  $[\text{Pt}(\text{PPh}_3)_3]$ .  
 (i) This shows trigonal planar geometry.  
 (ii) Coordination number of Pt is 3.  
 (iii) The hybridization of Pt in this complex is  $sp^3$ .  
 The **correct** statement/s is/are,  
 a) (ii) only                      b) (i) & (iii) only                      c) (ii) & (iii) only  
 d) (i) & (ii) only                      e) (i), (ii) & (iii).

7. What is the **Valence Electron Count (VEC)** of Co in  $[\text{CoClBr}_2(\text{CO})(\text{NH}_3)]$ ?  
(Group number of Co is 9)  
a) 16      b) 17      c) 18      d) 09      e) 10
8. Predict the spin only **magnetic moment** in B.M. of the complex  $[\text{Co}(\text{H}_2\text{O})_6]\text{Cl}_3$ .  
Water is a **weak ligand** and  $\mu = [n(n+2)]^{1/2}$  (Atomic no. of Co = 27)  
a) 0      b) 1.73      c) 2.83      d) 4.89      e) 5.91
9. Which one of the following complexes would give the **highest** molar conductivity?  
a)  $[\text{Cr}(\text{CO})_2(\text{NH}_3)_4]\text{Cl} \cdot 2\text{H}_2\text{O}$       b)  $[\text{CrCl}_2(\text{NH}_3)_4]\text{Cl}$   
c)  $\text{K}_3[\text{Cr}(\text{CN})_6]$       d)  $[\text{CrCl}(\text{NH}_3)_5]\text{Cl}_2$   
e)  $[\text{CrCl}_3(\text{NH}_3)_3]$
10. Pick the **incorrect** statement considering the two compounds (A) and (B).  
L = neutral ligand.      (A)  $[\text{CoBr}_2\text{L}_4]$       (B)  $[\text{Co}(\text{H}_2\text{O})\text{L}_5]\text{Cl} \cdot \text{H}_2\text{O}$   
a) (A) shows cis-trans isomerism.  
b) (B) shows hydrate isomerism.  
c) (A) and (B) are octahedral complexes.  
d) (B) shows ionization isomerism.  
e) The molar conductivity of (B) is about  $100 \text{ m}^2 \Omega^{-1} \text{ mol}^{-1}$ .
11. The number of **possible** geometrical isomers of the complex  $[\text{MA}_3\text{B}_2\text{C}]$  is  
a) 6      b) 5      c) 4      d) 3      e) 2
12. Which one of the following statements is **true** about *fac*- $[\text{CrBr}(\text{SO}_4)(\text{CO})_3]$ .  
a) Oxidation number of Cr is +2.  
b) Bromide ligand is not *trans* to carbon atom.  
c) Bromide ligand is *trans* to oxygen atom.  
d) Secondary valency of Cr is five.  
e) It does not show optical isomerism.
13. Select the **correct** statement regarding the complex  $[\text{CoCl}(\text{NH}_3)_3]$ .  
(Atomic number of Co is 27).  
a) It is a square planar complex.  
b) Its IUPAC name is triammoniachlorocobalt(I).  
c) The hybridization of Co in this complex is  $sp^3$ .  
d) Cobalt centre obeys the EAN rule.  
e) The co-ordination number of Co is four and its VEC is 18.
14. Consider the following statements regarding  $[\text{Fe}(\text{H}_2\text{O})_6]\text{Cl}_2$ . Water is a **weak** ligand.  
(i) It is a diamagnetic complex with six *d*-electron in the  $t_{2g}$  level.  
(ii) The crystal field stabilization energy is  $-0.4 \Delta_0$ .  
(iii) It is an octahedral complex where no electrons lie in the  $e_g$  level.  
The **correct** statement/s is/are  
a) (i), (ii) & (iii)      b) (i) & (ii) only      c) (i) & (iii) only.  
d) (ii) & (iii) only.      e) Answer is not given

15. Pick the **correct** statement. (Atomic no. of Co = 27)
- The valence electron count of Co in  $[\text{CoH}(\text{CO})_4]$  is 16.
  - $[\text{CoH}(\text{CO})_3]$  is coordinatively saturated complex.
  - $[\text{CoH}(\text{CO})_3] + \text{H}_2 \rightarrow [\text{CoH}_2(\text{CO})_3]$  is an oxidative addition reaction.
  - $[\text{CoMe}(\text{CO})_3] + \text{CO} \rightarrow [\text{Co}(\text{COMe})(\text{CO})_3]$  is an insertion reaction.
  - All the above statements are false.
16. The sharp melting point of crystalline solids is due to..
- a regular arrangement of constituent particles observed over a short distance in the crystal lattice
  - a regular arrangement of constituent particles observed over a long distance in the crystal lattice
  - same arrangement of constituent particles in different directions
  - different arrangement of constituent particles in different directions
  - the substance melts at a low temperature.
17. Consider the following statements regarding lattices and unit cells
- Lattice points all have identical surroundings.
  - A given crystal system will have different unit cells depending on the lattice points on the system.
  - The unit cell is the smallest building block from which the whole lattice can be build.
- The **correct** statement is/are
- (i) only
  - (ii) only
  - (i) and (iii) only
  - (ii) and (iii) only
  - (i), (ii) and (iii)
18. Three elements A, B and C crystalize into a cubic solid lattice. Atoms A occupy the corners, B occupies the centre of cube and C occupies the centre of edges. The **formula** of the compound is
- ABC
  - $\text{ABC}_2$
  - $\text{ABC}_3$
  - $\text{ABC}_4$
  - $\text{A}_2\text{BC}$
19. Co-ordination number of a crystalline solid is:
- Number of particles in the unit cell
  - Number of nearest neighbours of a particle
  - Number of octahedral voids in a unit cell
  - Number of tetrahedral voids in a unit cell
  - Total number of octahedral and tetrahedral voids
20. The number of atoms per unit cell in a bcc structure is
- 1
  - 2
  - 4
  - 6
  - 8
21. Hexagonal close packing and cubic closed packing gives rise to close-packed structures. Close packed structures always have:
- Highest packing efficiency
  - Highest void fraction
  - Highest density
- The **correct** answer is
- (i) only
  - (iii) only
  - (i) and (iii) only
  - (i) and (ii) only
  - (i), (iii) and (iii)

22. Which of the following defects **decrease** the density of a crystalline solid?

- (i) Interstitial defect      (ii) Vacancy defect  
(iii) Frenkel defect      (iv) Schottky defect

The **correct** answer/s is/are

- (a) (i) only      (b) (ii) only      (c) (iv) only  
(d) (i) and (ii) only      (e) (ii) and (iv) only

23. Consider the following statements regarding Miller indices.

- (i) Numbers are always separated by commas.  
(ii) They cannot have fractions.  
(iii) Negative numbers are indicated with a bar sign above the digit.

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

- (a) (i) only      (b) (ii) only      (c) (i) and (ii) only  
(d) (ii) and (iii) only      (e) (i) and (iii) only

24. Voids are empty spaces in a lattice. Which of the following lattices has the highest void fraction?

- (a) Face centered cubic      (b) Body centered cubic  
(c) Hexagonal close packed      (d) Primitive cubic  
(e) Cubic close packed

25. X-rays are used for studying crystal structures of solids because,

- (a) They have very high energy hence they can penetrate through solids.  
(b) They are electromagnetic radiation comparable to interatomic distances.  
(c) Their wavelengths are comparable to interatomic distances.  
(d) Their high energy frequency enables rapid analysis.  
(e) They can produce coloured pattern.

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B. Sc. Degree Programme - Level 4

CAT-I - 2019/2020

## CYU4300 - Inorganic Chemistry



MCQ Answer Sheet: Mark a cross (×) over the English Letter that corresponds to the most suitable answer.

Reg. No.

## FOR EXAMINER'S USE ONLY

Answers	No.	Marks
Correct		
Wrong		
Total		

1	a	b	c	d	e	2	a	b	c	d	e	3	a	b	c	d	e	4	a	b	c	d	e
5	a	b	c	d	e	6	a	b	c	d	e	7	a	b	c	d	e	8	a	b	c	d	e
9	a	b	c	d	e	10	a	b	c	d	e	11	a	b	c	d	e	12	a	b	c	d	e
13	a	b	c	d	e	14	a	b	c	d	e	15	a	b	c	d	e	16	a	b	c	d	e
17	a	b	c	d	e	18	a	b	c	d	e	19	a	b	c	d	e	20	a	b	c	d	e
21	a	b	c	d	e	22	a	b	c	d	e	23	a	b	c	d	e	24	a	b	c	d	e
25	a	b	c	d	e																		

**Answer Guide for CAT-I-2019/2020**  
**CYU4300 – Inorganic Chemistry held on 05-08-2019**

**MCQ ANSWERS**

1. d 2. b 3. e 4. d 5. c 6. e 7. a 8. d 9. c 10. d  
11. d 12. e 13. a 14. e 15. d 16. b 17. e 18. c 19. b 20. b  
21. a 22. e 23. d 24. d 25. c

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Name: .....

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