INDIAN SCHOOL AL WADI AL KABIR

Class: XII	**DEPARTMENT: SCIENCE (2020-21)** **SUBJECT: CHEMISTRY**	**Date of completion:** **I week of November, 2020**
Worksheet No:12 with answers	**TOPIC: COORDINATION COMPOUNDS**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT	**CLASS & SEC:**	**ROLL NO.**

MULTIPLE CHOICE QUESTIONS

1. Which of the following is a didentate ligand?

a) $C_2O_4^{2-}$ b) H_2O c) NH_3 d) CN^-

2. Coordination number of $[Fe(C_2O_4)_3]^{3-}$ is …….

a) 3 b) 4 c) 5 d) 6

3. Identify the heteroleptic complex from the following:

a) $[Cu(CN)_4]^{3-}$

b) $[Co(NH_3)_6]^{3+}$

c) $[Co(NH_3)_4Cl_2]^+$

d) $[PtCl_4]^{2-}$

4. The oxidation number of cobalt in $[Co(NH_3)_4Cl_2]^+$ is ……..

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

5. IUPAC name of $[Cr(NH_3)_3(H_2O)_3]Cl_3$ is …….

a) Triamminetriaquachromium(II) chloride

b) Triamminetriaquachromium(III) chloride

c) Triamminetriaquachromium(I) chloride

d) Triaminetriaquachromium(III) chloride

6. The formula of Potassium trioxalatoaluminate(III) is ……

a) $K[Al(C_2O_4)_3]$

b) $K_2[Al(C_2O_4)_3]$

c) $K_3[Al(C_2O_4)_3]$

d) $K_3[Al_3(C_2O_4)]$

7. Identify the possible hybridization of a complex if its coordination number is 6.

a) sp^3 b) dsp^2 c) sp^3d d) sp^3d^2

8. In spectrochemical series, which of the following ligand has greatest field strength?

a) I^- b) NH_3 c) OH^- d) CO

9. On the basis of CFT, the electronic configuration for d^6 ion, if $\Delta_o > P$ is …….

a) $t_{2g}^6 e_g^0$ b) $t_{2g}^4 e_g^2$ c) $t_{2g}^5 e_g^1$ d) $t_{2g}^3 e_g^3$

10. Which of the following statements is not true about Valence Bond Theory.

a) It involves a number of assumptions.

b) It distinguishes between weak and strong ligands.

c) It does not give quantitative interpretation of magnetic data.

d) It does not explain the colour exhibited by coordination compounds.

Read the given passage and answer the questions that follow:

According to Valence Bond Theory theory, the metal atom or ion under the influence of ligands can use its (n-1)d, ns, np or ns, np, nd orbitals for hybridisation to yield a set of equivalent orbitals of definite geometry such as octahedral, tetrahedral, square planar and so on. These hybridised orbitals are allowed to overlap with ligand orbitals that can donate electron pairs for bonding. It is usually possible to predict the geometry of a complex from the knowledge of its magnetic behaviour on the basis of the valence bond theory.

11. Is $[Co(NH_3)_6]^{3+}$ an inner orbital or outer orbital complex?

12. Identify the magnetic behaviour of the complex $[Ni(CO)_4]$

13. Calculate the spin only magnetic moment of $[MnBr_4]^{2-}$

Assertion and Reason Type

14. Assertion: $[CoF_6]^{3-}$ is called outer orbital or high spin complex.
Reason: It uses outer orbital (4d) in hybridization.

a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
c) Assertion is correct, but reason is wrong statement.
d) Assertion is wrong, but reason is correct statement.

15. Assertion: $[Fe(CN)_6]^{4-}$ is a heteroleptic complex.
Reason: It is a complex ion in which the metal is bound to only one kind of donor groups.

a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
c) Assertion is correct, but reason is wrong statement.
d) Assertion is wrong, but reason is correct statement.

16. Assertion: $[Ni(CO)_4]$ has tetrahedral geometry.
Reason: IUPAC name of $[Ni(CO)_4]$ is Tetracarbonylnickel(0)

a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
c) Assertion is correct, but reason is wrong statement.
d) Assertion is wrong, but reason is correct statement.

Question – Answer Type:

17. Write IUPAC name of the complex $[Pt(en)_2Cl_2]$. **1**

18. Using valence bond theory, predict the hybridization and magnetic character of the complex, $[Co(NH_3)_6]^{3+}$ **1**

19. Write the electronic configuration of d^5 on the basis of crystal field theory when: **1**

(i) $\Delta_O < P$

(ii) $\Delta_O > P$

20. (i) When a coordination compound $CrCl_3.\ 6H_2O$ is mixed with $AgNO_3$, two moles of AgCl are precipitated per mole of the compound. What is the structural formula of the coordination compound? **2**

(ii) What is the difference between a complex and a double salt?

21. Using IUPAC norms write the formulae for the following: **2**

(i) Hexaamminecobalt(III) sulphate

(ii) Potassium trioxalatochromate(III)

22. Although both $[NiCl_4]^{2-}$ and $[Ni(CO)_4]$ have sp^3 hybridization yet $[NiCl_4]^{2-}$ is paramagnetic and $[Ni(CO)_4]$ is diamagnetic. Give reason. (Atomic no. of Ni = 28) **2**

23. Write the hybridization and number of unpaired electrons in the complex $[CoF_6]^{3-}$ (Atomic No. of Co = 27) **2**

24. Write the IUPAC names of the following coordination compounds: **3**

a) $[Pt(NH_3)_2Cl(NO_2)]$

b) $K_2[PdCl_4]$

c) $K_3[Fe(C_2O_4)_3]$

25. Write the hybridization and magnetic character of the following complexes: **3**

(i) $[Fe(H_2O)_6]^{2+}$

(ii) $[Ni(CN)_4]^{2-}$ [Atomic number : Fe = 26, Ni = 28]

ANSWERS

1.	a
2.	d
3.	c
4.	c
5.	b
6.	c
7.	d
8.	d
9.	a
10.	b
11.	Inner orbital complex.
12.	Diamagnetic.
13.	n = 5 $\mu = \sqrt{n(n+2)}$ = 5.9 BM
14.	a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
15.	d) Assertion is wrong, but reason is correct statement.
16.	b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
17.	Bis(ethane-1,2-diamine)dichloridoplatinum (II)
18.	d^2sp^3, diamagnetic.
19.	i) $t_{2g}^3 e_g^2$ ii) $t_{2g}^5 e_g^0$
20.	(i) $[Cr(H_2O)_5Cl]Cl_2 . H_2O$ (ii) Double salt dissociates into simple ions completely when dissolved in water while Complex salt does not.
21.	i) $[Co(NH_3)_6]_2(SO_4)_3$ ii) $K_3[Cr(C_2O_4)_3]$
22.	In $[NiCl_4]^{2-}$, Cl^- is a weak field ligand due to which there are two unpaired electrons in 3d orbital whereas in $[Ni(CN)_4]^{2-}$, CN^- is a strong field ligand due to which pairing leads to no unpaired electron in 3d- orbital.
23.	Hybridization is $sp^3 d^2$ Number of unpaired electrons = 4 (Explain)

24.	a) Diamminechloridonitrito-N-platinum(II) b) Potassium tetrachloridopalladate(II) c) Potassium trioxalatoferrate(III)
25.	(i) sp^3d^2, paramagnetic (ii) dsp^2, diamagnetic (Explain)

PREPARED BY: MR. ANOOP STEPHEN	CHECKED BY: HOD - SCIENCE