

Class: 12
Subject: chemistry
Topic: coordination compounds
No. of Questions: 20
Duration: 60 Min
Maximum Marks: 60

1. The coordination number of iron in potassium ferricyanide is
- 2
 - 3
 - 4
 - 6

Sol: D fact

2. The oxidation number of cobalt in $[\text{Co}(\text{CO})_4]\text{Cl}_3$ is
- +1
 - +3
 - 1
 - 3

Sol: B fact

3. The number of unidentate ligands in the complex is called
- Primary valency
 - effective atomic number
 - secondary valency (coordination number)
 - atomic number

Sol: C fact

4. If NaOH is added to zinc sulphate solution a white precipitate apperes and dissolves. In this solution, zinc exist in the
- anionic part
 - cationic part
 - both cationic and anionic part
 - none of these

Sol: A $\text{ZnSO}_4 + 2\text{NaOH} \longrightarrow \text{Na}_2\text{ZnO}_2 + \text{Na}_2\text{SO}_4$; $\text{Na}_2\text{ZnO}_2 \longrightarrow 2\text{Na}^+ + \text{ZnO}_2^{2-}$

5. The complex that violates the Sidwick's E.A.N. rule
- Potassium ferrocyanide
 - Nickel carbonyl
 - Potassium ferricyanide
 - Cobalthexaamine chloride

Sol: C

EAN Values	(1) $K_4[Fe(CN)_6]$:	$26 - 2 + 12 = 36$
	(2) $[Ni(CO)_4]$:	$28 - 0 + 8 = 36$
	(3) $K_3[Fe(CN)_6]$:	$26 - 3 + 12 = 35$
	(4) $[Co(NH_3)_6]Cl_3$:	$27 - 3 + 12 = 36$

6. One among the following is an example of hexadentate ligands
- 2,2'-bipyridyl
 - Ethylene diammine tetra acetate ion
 - Dimethyl glyoxime
 - Terpy

Sol: B

2,2'-bipyridyl and dimethyl glyoxime are bidentate ligands. Terpy is 2,2',2''-Terpyridine. It is a tridentate ligand

7. Which of the following can participate in linkage isomerism?
- $H_2NCH_2CH_2NH_2$
 - NO_2^-
 - NH_3
 - H_2O

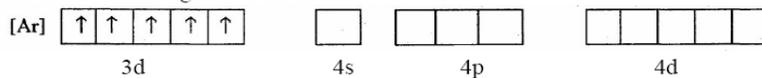
Sol: B

NO_2^- can attach a central metal atom or ion either through nitrogen atom or through oxygen atom. Hence it can show linkage isomerism

8. Water is a weak ligand. Then the number of unpaired electrons present in the complex ion $[Mn(H_2O)_6]^{2+}$ is
- 2.
 - 3
 - 4
 - 5

Sol: D

The electronic configuration of Mn in the +2 state is



Since water is a weak ligand, no electron pairing takes place and hence outer orbital complex involving 4s, 4p and 4d orbitals are formed. Hence 5 unpaired electrons are present. The hybridisation taking place is sp^3d^2

9. A ligand can also be regarded as

- Lewis acid
- Bronsted base
- Lewis base
- Bronsted acid

Sol: C

Ligands donate electron pairs. Hence they are Lewis bases

10. Which one of the following gives maximum amount of AgCl Precipitate?

- $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$
- $[\text{CrCl}(\text{H}_2\text{O})_5]\text{Cl}_2 \cdot \text{H}_2\text{O}$
- $[\text{CrCl}_2(\text{H}_2\text{O})_4]\text{Cl} \cdot 2\text{H}_2\text{O}$
- $[\text{CrCl}_3(\text{H}_2\text{O})_3] \cdot 2\text{H}_2\text{O}$

Sol: A

In the first compound three chloride ions are in the ionization sphere. And all of these with AgNO_3 giving maximum amount of the precipitate. 4th compound does not give any precipitate

11. IUPAC name of $\text{Na}_3[\text{Co}(\text{NO}_2)_6]$ is

- Sodium cabaltnitrite
- Sodium hexanitritocobaltate(III)
- Sodium hexanitrocobalt(III)
- Sodium hexanitritocobaltate(II)

Sol: B fact

12. Complex compound in which oxidation number of metal is zero, is

- $\text{K}_4[\text{Fe}(\text{CN})_6]$
- $\text{K}_3[\text{Fe}(\text{CN})_6]$
- $[\text{Ni}(\text{CO})_4]$
- $[\text{Pt}(\text{NH}_3)_4]\text{Cl}_2$

Sol: C fact

13. Nickel tetracyanide complex has

- Linear structure
- Square planar structure
- Tetrahedral structure
- None

Sol: B

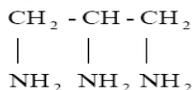
$[\text{Ni}(\text{CN})_4]^{2-}$ ion, Ni undergoes dsp^2 hybridisation giving a square planar structure

14. Which one of the following is a tridentate ligand?

- Ethylene diamine
- Ammonia
- Oxalate
- 1,2,3-triamino propane

Sol: D

Ethylene diamine and oxalate ligands are bidentate. Ammonia is a monodentate ligand. 1,2,3-triamino propane is a tridentate ligand.



15. The number of ions produced per molecule by the complex $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$ is

- 2
- 3
- 4
- 6

Sol: A

$[\text{CoCl}_2(\text{NH}_3)_4] \rightarrow [\text{CoCl}_2(\text{NH}_3)_4]^{+1} + \text{Cl}^-$. Hence a total of 2 ions per molecule

16. The oxidation state of iron in potassium ferrocyanide is

- 2
- 3
- 4
- 1

Sol: A fact

17. Assertion (a) A stable complex is formed when ethylenediamine (en) is added to $[\text{Ni}(\text{H}_2\text{O})_4]^{2+}$ Reason (r) (en) being a strong ligand replaces weak ligand H_2O and thus. Chelate is formed.
- Both (a) and (r) are true and (r) is the correct explanation of (a).
 - Both (a) and (r) are true but (r) is not the correct explanation of (a).
 - (a) is true but (r) is false
 - (a) is false but (r) is true

Sol: A fact

18. An octahedral complex is formed, when hybrid orbitals of the following type are involved
- Sp^3
 - Dsp^2
 - D^2sp^3
 - Sp^2d

Sol: C fact

19. The number of ions in tetraammine copper (ii) hydroxide is
- Seven
 - Two
 - Three
 - Four

Sol: C

Formula of tetraamminecopper(II) hydroxide is $[\text{Cu}(\text{NH}_3)_4] (\text{OH})_2$. It ionises giving 3 ions

20. The compounds $[\text{PtCl}_2(\text{NH}_3)_4] \text{Br}_2$ and $[\text{PtBr}_2(\text{NH}_3)_4] \text{Cl}_2$ form a pair of
- Coordinate isomers
 - Linkage isomers
 - Optical isomers
 - Isonisation isomers

Sol: D fact