Co-ordination Compounds

1. **Assertion (A):** The aqueous solution of $K_2SO_4.Al(SO_4)_3.24H_2O$ is acidic in nature.

   Reason (R): It ionizes to give a complex ion.

   (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

   (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

   (3) (A) is true but (R) is false

   (4) Both (A) and (R) are false

2. **Assertion (A):** In the complex $K_2[PtCl_6]$ coordination number of Pt is 6.

   Reason (R): In the complex six coordination bonds are formed between Pt and chloro ligands.

   (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

   (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

   (3) (A) is true but (R) is false

   (4) Both (A) and (R) are false

3. **Assertion (A):** Tetrahedral complex do not exhibit geometrical isomerism.

   Reason (R): In tetrahedral complex all the four positions are identical.

   (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

   (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

   (3) (A) is true but (R) is false

   (4) Both (A) and (R) are false

4. **Assertion (A):** $[Fe(CO)_5]$ is inner orbital complex.

   Reason (R): In the given complex oxidation state of Iron is zero.

   (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

   (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

   (3) (A) is true but (R) is false

   (4) Both (A) and (R) are false

5. **Assertion (A):** $[Fe(CN)_6]^{-3}$ is paramagnetic in nature.

   Reason (R): $[Fe(CN)_6]^{-3}$ is low spin complex.

   (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

   (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

   (3) (A) is true but (R) is false

   (4) Both (A) and (R) are false

6. **Assertion (A):** Hexachloroplatinate is a complex anion.

   Reason (R): Complex has negatively charged ligands.

   (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

   (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

   (3) (A) is true but (R) is false

   (4) Both (A) and (R) are false

7. **Assertion (A):** $[Ni(CN)_4]^{-2}$ has zero unpaired electron while that of $[NiCl_4]^{-2}$ has two unpaired e^-.

Reason (R): $[NiCl_4]^{-2}$ has strong crystal field while $[NiCl_4]^{-2}$ has weak crystal field.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

8. **Assertion (A):** Cis – $[Fe(en)_2Cl_2]^+$ can form racemic mixture.

Reason (R): Cis – $[Fe(en)_2Cl_2]^+$ is square planar complex.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

9. **Assertion (A):** Square planar complex Ma_2b_2 has two optical isomers.

Reason (R): Mirror image of Ma_2b_2 is non-super impossible.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

10. **Assertion (A):** AgI is coloured while AgF is colourless.

Reason (R): Unpaired e^- Present In AgI.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

11. **Assertion (A):** $[CoF_6]^{3-}$ is high spin complex.

Reason (R): F^- is strong field ligand.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

12. **Assertion (A):** Ferrocene is π– bonded organometallic compound.

Reason (R): Ferrocene is a sandwich compound.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

13. **Assertion (A):** Solution of Na_2CrO_4 in water is intensely coloured.

Reason (R): Ox, state of Cr in Na_2CrO_4 is +6.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

14. **Assertion (A):** Potassium ferrocyanide is diamagnetic whereas potassium ferricyanide is paramagnetic.

Reason (R): Crystal field splitting in ferrocyanide ion is greater than that of ferricyanide ion.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

15. **Assertion (A):** In a mixture of Cd (II) and Cu(II), (Cd^{+2}) gets precipitated in presence of KCN by H_2S.

Reason (R): The stability constant of $[Cu(CN)_4]^{-3}$ is greater than $[Cd(CN)_4]^{2-}$.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

16. **Assertion (A):** aq. Solution of $CoCl_2$ is pink in colour. It turns blue in presence of conc, HCl.

Reason (R): It is due to formation of $[CoCl_4]^{2-}$.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

17. **Assertion (A):** Triethylenediamine is a bidentate monoanion

Reason (R): Complex containing propylenediamine ligand shows ligand isomerism.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

18. **Assertion (A):** $[Co^{III}(gly)_3]$ is called inner-metallic complex because.

Reason (R): Both the coordination number and charge of the cation are satisfied simultaneously by ligands.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

19. **Assertion (A):** All tetrahedral complexes are mainly high spin and low spin configurations are rarely observed.

Reason (R): Δ_t is always much smaller even with stronger field ligands and it is never energetically favourable to pair up the electrons.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

20. **Assertion (A):** NH_2NH_2 although possesses two electron pairs for donation but not acts as a chelating agent.

Reason (R): The coordination by NH_2NH_2 leads to a three member highly unstable strained ring

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

21. **Assertion (A):** The correct order for the wave length of absorption in the visible region is ; $[Ni(NO_2)_6]^{4-} < [Ni(NH_3)_6]^{2+} < [Ni(H_2O)_6]^{2+}$

Reason (R): The stability of different complexes depends on the strength of the ligand field of the various ligands.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

22. **Assertion (A):** The 'spin only' magnetic moment of a green complex, potassium amminetetracyani donitrosonium chromate(I) is 1.73 BM.

Reason (R): To have two d-orbitals empty for d^2sp^3 hybridisation, the pairing of electrons take place leaving behind one unpaired electron as CN^- is a stronger ligand.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

23. **Assertion (A):** Pentaamminethiocyanato-N-chromium (III) tetrachloridozincate (II) is a coloured compound and is an example of ionisation isomerism.

Reason (R): The compound is paramagnetic and therefore, d-d transition is possible

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

24. **Assertion (A):** $Cu[Hg(SCN)_4]$ and $Hg[Co(NCS)_4]$ are isomers.

Reason (R): SCN^- is an ambidentate ligand.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

25. **Assertion (A):** Coordination number of Pt in Zeise's salt is 5.

Reason (R): C_2H_4 act as bidentate ligand.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

26. **Assertion (A):** Fe^{+3} not used brown ring test of NO_3^{-1}

Reason (R): NO_3^- is first converted into NO_2.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

27. **Assertion (A):** $[Co(H_2O)_6]^{+3} \rightarrow [Co(H_2O)_6]^{+2}$ changes its colour on reduction.

Reason (R): Crystal field stabilization energy increases on reduction

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

28. **Assertion (A):** If in $[Co(NH_3)_6]^{+3}$, NH_3 is replaced by H_2O , same wavelength will be absorbed by the complex :

Reason (R): It is a high spin species.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

29. **Assertion (A):** $\left[Co\left(NH_3\right)_5 Cl\right]Cl_2$ reacts with excess of $AgNO_3$ solution to give 2 moles of AgCl.

Reason (R): Primary valencies are ionisable.

(1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)

(2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	3	1	1	2	2	2	1	3	4	3	3	2	2	3	1	1	4	2	1	1
Que.	21	22	23	24	25	26	27	28	29											
Ans.	2	1	4	4	2	3	3	4	1											