# QB365 Question Paper Software
## 12th Standard - Chemistry
## Coordination Compounds Assertion and reason

Exam Time: 00:20 Hrs | Date: 2025-10-01
Total Marks: 10

## Questions:

1. In the following questions. an Assertion (A) is followed by a corresponding Reason (R) Use the following keys to choose the appropriate answer.
**Assertion (A)** In the coordination compound $[Co(H_2NCH_2CH_2NH_2)_3]_2$,ethane-1,2-diamine is a neutral ligand.
**Reason (R)** Oxidation number of Co in the complex ion is +3.
**Codes:**
(a) Both (A) and (R) are correct, (R) is the correct explanation of (A).
(b) Both (A) and (R) are correct, (R) is not the correct explanation of (A).
(c) (A) is correct; (R) is incorrect.
(d) (A) is incorrect; (R) is correct.

2. In the following questions. an Assertion (A) is followed by a corresponding Reason (R) Use the following keys to choose the appropriate answer.
**Assertion (A)** Tetrahedral complexes do not show geometrical isomerism.
**Reason (R)** The relative positions of the unidentate ligands attached to the central metal atom are the same with respect to each other.
**Codes:**
(a) Both (A) and (R) are correct, (R) is the correct explanation of (A).
(b) Both (A) and (R) are correct, (R) is not the correct explanation of (A).
(c) (A) is correct; (R) is incorrect.
(d) (A) is incorrect; (R) is correct.

3. In the following questions. an Assertion (A) is followed by a corresponding Reason (R) Use the following keys to choose the appropriate answer.
**Assertion (A)** Oxidation number of Cr in $[Cr(NH_3)_3(H_2O)_3]Cl_3$ is same as the charge of the complex ion, +3.
**Reason (R)** All the ligands are neutral molecules in this compound.
**Codes:**
(a) Both (A) and (R) are correct, (R) is the correct explanation of (A).
(b) Both (A) and (R) are correct, (R) is not the correct explanation of (A).
(c) (A) is correct; (R) is incorrect.
(d) (A) is incorrect; (R) is correct.

4. In the following questions. an Assertion (A) is followed by a corresponding Reason (R) Use the following keys to choose the appropriate answer.
**Assertion (A)** The ligands of nitro and nitrito are called ambidentate ligands .
**Reason (R)** These ligands give linkage isomers.
**Codes:**
(a) Both (A) and (R) are correct, (R) is the correct explanation of (A).
(b) Both (A) and (R) are correct, (R) is not the correct explanation of (A).
(c) (A) is correct; (R) is incorrect.
(d) (A) is incorrect; (R) is correct.

5. In the following questions. an Assertion (A) is followed by a corresponding Reason (R) Use the following keys to choose the appropriate answer.
**Assertion (A)** The total number of isomers shown by $[Co(en)_2Cl_2]^+$ complex ion-is three.
**Reason (R)** $[Co(en)_2Cl_2]^+$ complex ion has an octahedral geometry.
**Codes:**
(a) Both (A) and (R) are correct, (R) is the correct explanation of (A).
(b) Both (A) and (R) are correct, (R) is not the correct explanation of (A).
(c) (A) is correct; (R) is incorrect.
(d) (A) is incorrect; (R) is correct.

6. **Assertion:** The ligands nitro and nitrito are called ambidentate ligands.
**Reason:** An ambidentate ligand can attach to metal through two different atoms.
**Codes:**
(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.

7. **Assertion:** Thiocarbonyl is a neutral ligand.
**Reason :** Thiocarbonyl has three donor atoms but behaves as a bidentate ligand.
**Codes:**
(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.

8. **Assertion:** $[CrCl_2(H_2O)_4]NO_3$ is dichlorotetraaquachromium(III) nitrate.
**Reason :** In writing the name of the.complex cation is written first followed by the anion.
**Codes:**
(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.

9. **Assertion:** $[Al(NH_3)_6]^{3+}$ does npt exist in aqueous solution.
**Reason:** $NH_3$ is a neutral ligand.
**Codes:**
(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.
(c) Assertion is correct statement but reason is wrong statement.
(d) Assertion is wrong statement but reason is correct statement.

10. **Assertion:** All the octahedral complexes of $Ni^{2+}$ must be outer orbital complexes.
**Reason:** Outer orbital octahedral complexes are given by weak ligands.

**Codes:**

(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.

(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

(c) Assertion is correct statement but reason is wrong statement.

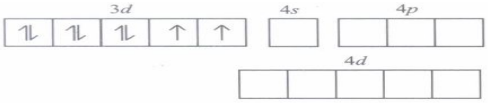
(d) Assertion is wrong statement but reason is correct statement

---

## Answers Key:

1. (b) Ethane-1, 2-diamine is a neutral ligand as it carries no charge. Oxidation number of Co in the complex ion is +3. Both (A) and (R) are correct but (R) is not the correct explanation of (A).
2. (a)Tetrahedral complexes do not show geometrical isomerism because the relative positions of the unidentate ligands attached to the central metal atom are same with respect to each other. Both (A) and (R) are correct and R is correct explanation of (A).
3. (a) Oxidation number of Cr in $[Cr(NH_3)_3(H_2O)_3]Cl_3$ is same as the charge ofthe complex ion, i.e. +3 because all the ligands are neutral molecules in this compound. Both (A) and (R) are correct and (R) is correct explanation of (A).
4. (a) When a monodentate ligand has two possible donor atoms and attached in two ways to the central metal atom then that ligand is called ambidentate ligand. e.g. nitro ($NO_2$) and nitrito (ONO). These show linkage isomerism. Both (A) and (R) are correct and (R) is the correct explanation of (A).
5. (b) $[Co(en)_2Cl_2]^+$exist in cis and trans isomers out of which cis isomer will be optically active (cis-d-isomer) and (cis-l-isomer). Both (A) and (R) are correct but (R) is not the correct explanation of (A).
6. **(a):** When a monodentate ligand has two possible donor atoms and attached in two ways to the central metal atom then that ligand is called ambidentate ligand. This leads to linkage isomerism.
7. **(c):** Thiocarbonyl (CS) has one donor atoms.
8. **(d):** Correct IUPAC name is tetraaquadichloridochromium (III) nitrate.
9. **(b):** The complex ion$[Al(NH_3)_6]^{3+}$ undergoes the change into new complex ion $[Al(H_2O)_6]^{3+}$ in aqueous medium due to higher heat of hydration of aluminium ion on account of its small size.

   $[Al(NH_3)_6]^{3+} + 6H_2O \rightarrow [Al(H_2O)_6]^{3+} + 6NH_3$
10. (b): $Ni^{2+}$ configuration.




During rearrangement only one 3d-orbital may be made available by pairing the electrons. Thus, inner d2sp3 hybridisation is not possible. So, only $sp^3d^2$ (outer) hybridisation can occur.