

QB365 Question Paper Software
12th Standard - Chemistry**d- and f- Block Elements 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) First ionisation enthalpy of Cr is lower than that of Zn.

Reason (R) Ionisation enthalpy of Cr is lower than Zn due to the stability of d^5 -electron configuration.

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) Cr^{2+} is reducing, while Mn^{3+} is oxidising even both have d^4 -configuration.

Reason (R) Configuration of Cu changes from d^3 to d^4 .

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. **Assertion:** Fe^{2+} is paramagnetic.

Reason: Fe^{2+} contains four unpaired electrons

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

4. **Assertion:** Most of the trivalent lanthanide ions are coloured both in the solid state and in aqueous solution.

Reason: The elements with xf electrons have a similar colour to those of $(14 - x) f$ electrons

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

5. **Assertion:** The correct order of oxidising power is: $\text{VO}_2^+ < \text{VO} < \text{VO}_2^+$.

Reason: The oxidation state of Mn is +7.

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.

6. In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices

Assertion: Cu^{2+} iodide is not known.

Reason: Cu^{2+} oxidises I^- to iodine.

Codes:

(a) Both assertion and reason are true, and reason is the correct explanation of the assertion.

(b) Both assertion and reason are true but reason is not the correct explanation of assertion.

(c) Assertion is not true but reason is true.

(d) Both assertion and reason are false.

7. **Assertion :** Cuprous ion (Cu^+) has unpaired electrons while cupric ion (Cu^{++}) does not.

Reason : Cuprous ion (Cu^+) is colourless whereas cupric ion (Cu^{++}) is blue in the aqueous solution.

Codes:

(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

(c) If the Assertion is correct but Reason is incorrect.

(d) If both the Assertion and Reason are incorrect.

8. **Assertion :** Transition metals are good catalysts.

Reason : V_2O_5 or Pt is used in the preparation of H_2SO_4 by contact process.

Codes:

(a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.

(b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.

(c) If the Assertion is correct but Reason is incorrect.

(d) If both the Assertion and Reason are incorrect.

9. **Assertion:** Transition metals show variable valence.

Reason: Due to a large energy difference between the ns^2 and $(n-1)d$ electrons.

Codes:

a) Both assertion and reason are true, and the reason is the correct explanation of the assertion.

b) Both assertion and reason are true but the reason is not the correct explanation of assertion.

- c) Assertion is not true but the reason is true.
- d) Both assertion and reason are false.

10. **Assertion:** It is not possible to obtain anhydrous ZnCl_2 by heating $\text{ZnCl}_2 \cdot 2\text{H}_2\text{O}$.

Reason: $\text{ZnCl}_2 \cdot 2\text{H}_2\text{O}$ undergoes hydrolysis to produce Zn(OH)_2 and HCl .

Codes:

- a) Both assertion and reason are true, and the reason is the correct explanation of the assertion.
- b) Both assertion and reason are true but the reason is not the correct explanation of assertion.
- c) Assertion is not true but the reason is true.
- d) Both assertion and reason are false.

Answers Key:

1. (a) First ionisation enthalpy of Cr is lower than that of Zn due to the stability of d^5 by losing one electron from outer s-orbital and the value for Zn is higher due to stable $d^{10} s^2$ configuration.
2. (c) Cr^{2+} is reducing, while Mn^{3+} is oxidising when both have d^4 configuration. Cr^{2+} is reducing as its configuration changes from d^4 to d^3 , the latter having a half-filled t_{2g} level. On the contrary, the change from Mn^{3+} to Mn^{2+} results in the half-filled (d^5) configuration which has extra stability. Thus, (A) is correct but (R) is incorrect.
3. **(a):** Fe has atomic number 26. So, its electronic configuration is $[\text{Ar}]3d^6 4s^2$.
 Fe^{2+} has electronic configuration $[\text{Ar}]3d^6$.



It has four unpaired electrons and it is paramagnetic.

4. **(b):** The lanthanide ions are coloured due to the partly filled f-orbitals which permits f-f transition.
5. **(d):** The oxidation states of the given compounds are the following.
 $\text{VO}_2^+ : x + 2(-2) = +1$
 $\Rightarrow x = +5$
 VO
 $\Rightarrow x - 2 = 0; x = +2$
 $\text{VO}^{2+} : x + 1(-2) = +2$
 $x = +4$
 The correct order of oxidising power is :
 $\text{VO} < \text{VO}^{2+} < \text{VO}_2^+$
6. (a) Both assertion and reason are true, and reason is the correct explanation of the assertion.
7. (b) If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
8. (a) If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
9. d) Both assertion and reason are false.
10. a) Both assertion and reason are true, and the reason is the correct explanation of the assertion.