QB365 Question Paper Software
12th Standard - Chemistry
Aldehydes , Ketones and Carboxylic Acids 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) α-hydrogen atoms of carbonyl compounds are acidic.
Reason (R) The strong electron releasing effect of the carbonyl group make the stabilisation of the conjugate base by the resonance.
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) Carboxylic acids have higher boiling liquids than aldehydes, ketones and even alcohols of comparable molecular masses.
Reason (R) More extensive association of carboxylic acid molecules through intermolecular hydrogen bonding is responsible for the high boiling point of carboxylic acid.
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) Formaldehyde is a planar molecule.
Reason (R) It contains sp^2-hybridized carbon atom.
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. **Assertion:** Hydrogen bonding in carboxylic acids is stronger than alcohols.
Reason: Highly branched carboxylic acids are more acidic than unbranched acids.
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:** m-Chlorobenzoic acid is a stronger acid than p-chlorobenzoic acid.
Reason: In m-chlorobenzoic acid both - I-effect and +R-effect of CI operate but in p-chlorobenzoic acid only +R-effect of Cl operates.
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. **Assertion**: Aldol condensation can be catalysed both by acids and bases.
Reason: β-Hydroxy aldehydes or ketones readily undergo acid catalysed dehydration.
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:** Lower aldehydes and ketones are soluble in water but the solubility decreases as the molecular mass increases.
Reason: Distinction between aldehydes and ketones can be done by Tollens test.
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**: Nitration of benzoic acid gives m-nitrobenzoic acid.
Reason: Carboxyl group increases the electron density at the meta-position.
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.

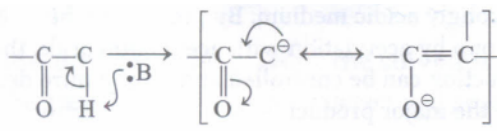
9. **Assertion**: α-Hydrogen atoms in aldehydes and ketones are acidic.
Reason: The anion left after the removal of a-hydrogen is stabilised by inductive effect.
Codes:
(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.
(b) Assertion and reason both 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 (A)** Aromatic carboxylic groups do not undergo Friedel- Crafts reaction.
Reason (R) Carboxyl group is deactivating and the catalyst aluminium chloride gets bonded to the carboxyl group.
(a) Both (A) and (R) are correct and (R) is the correct explanation of (A).
(b) Both (A) and (R) are correct but (R) is not the correct explanation of (A).
(c) (A) is correct but (R) is incorrect.
(d) (A) is incorrect but (R) is correct.

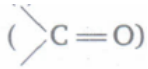
Answers Key:

1. (c) The acidity of α-hydrogen atoms of carbonyl compounds is due to the strong electron withdrawing effect of the carbonyl group and resonance stabilisation of the conjugate base.



Hence, (A) is correct but (R) is incorrect.

2. (a) Carboxylic acids are higher boiling liquids than aldehydes, ketones and even alcohols of comparable molecular masses. This is due to more extensive association of carboxylic acid molecules through intermolecular hydrogen bonding. Hence, both (A) and (R) are correct and (R) is the correct explanation of (A).
3. (a) The carbon-oxygen bond is carbonyl group



is composed of one sigma (c) and one σ and one pi (π) bond. The carbon in carbonyl group is sp^2-hybridised. Therefore, the three bonds in the carbonyl carbon are planar and trigonal with bond angle of 120°. (A) and (R) both are correct and (R) is the correct explanation of (A).
4. **(c):** Highly branched carboxylic acids are less acidic than unbranched acids. The +I effect of alkyl groups in branched acid increases the magnitude of negative charge. Thus, -COOH group is shielded from solvent molecules and cannot be stabilized by solvation as effectively as in unbranched carboxylic acids.
5. **(c) :** In p-chlorobenzoic acid, both +R and -1 effect operate together but in m-chlorobenzoic acid only -I effect operates. Therefore, m-chlorobenzoic acid is a stronger acid than p-chlorobenzoic acid.
6. **(b):** Both carbanions (formed in presence of base) and enol form (formed in presence of an acid) act as nucleophiles and hence add on the carbonyl group of aldehydes and ketones to give aldols.
7. **(b):** Lower aldehydes and ketones are soluble in water due to polar effect of C = O group which makes hydrogen bonds with water molecules. As the size of the aldehydes and ketones increases the hydrophobic part i.e., alkyl chain increases which weakens the H-bond formations with H_2O molecules and decreases the solubility.
8. **(c):** Carboxyl group only marginally decreases the electron density at m - position relative to 0 - and p - positions.
9. **(c):** The anion left after the removal of α-hydrogen is stabilized by resonance effect.
10.

(a) Aromatic carboxylic groups do not undergo Friedel-Crafts reaction because carboxyl group is deactivating and the catalyst aluminium chloride gets bonded to the carboxyl group.