# Uses of Aldehydes and Ketones: From Formalin to Vanilla

Where aldehydes and ketones turn up in daily life: formalin and Bakelite from formaldehyde, acetic acid from acetaldehyde, acetone as a solvent, and vanillin, cinnamaldehyde and benzaldehyde as smells and flavours, each explained from its C=O group.

Name: Date: Score: ____ / 15

## A. Fill in the blanks

**1.** Formalin is an aqueous solution of about 40% ____.

**2.** Phenol and formaldehyde give the polymer ____.

**3.** The flavouring compound of vanilla is ____.

**4.** Oxidation of acetaldehyde gives ____ acid.

## B. True or False

**5.** Acetone is used as an industrial solvent. True / False

**6.** Formaldehyde is less reactive than acetone towards nucleophiles. True / False

**7.** Benzaldehyde is used in perfumery and dyes. True / False

## C. Assertion and reason

**8. Assertion (A):** Acetone mixes with water and also dissolves grease.
**Reason (R):** It has a polar C=O group and non-polar $CH_3$ groups.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

**9. Assertion (A):** Formalin preserves biological specimens.
**Reason (R):** Formaldehyde joins protein chains through $–CH_2–$ bridges.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

## D. Choose the correct option

**10.** The compound used to preserve biological specimens is:

(a) acetone
(b) formaldehyde
(c) acetaldehyde
(d) benzaldehyde

Answer: _____

**11.** Cinnamaldehyde gives the flavour of:

(a) vanilla
(b) almond
(c) cinnamon
(d) lemon

Answer: _____

**12.** In the first step of Bakelite formation, the HCHO carbon is attacked by:

(a) the $O^-$ of phenoxide

(b) the ring carbon ortho to $O^-$

(c) water

(d) $H^+$

Answer: _____

## E. Numerical problems

**13.** How many alkyl groups are attached to the carbonyl carbon of formaldehyde?

## F. Short answer questions

**14.** Explain, with curved arrows, the first step of the reaction of phenoxide with formaldehyde.

## G. Match the columns

**15. Match each item in Column A with the correct item in Column B.**

| Column A | Column B | Your answer |
|---|---|---|
| 1. formaldehyde | (a) formalin, Bakelite | 1 → ____ |
| 2. acetaldehyde | (b) acetic acid | 2 → ____ |
| 3. acetone | (c) vanilla flavour | 3 → ____ |
| 4. vanillin | (d) solvent | 4 → ____ |

## Detailed solutions

**1.** formaldehyde

**2.** Bakelite

**3.** vanillin

**4.** acetic

**5.** True. Acetone and ethyl methyl ketone are common solvents.

**6.** False. HCHO has no alkyl groups, so it is the most reactive.

**7.** True. It has an almond odour.

**8.** (a) R explains A.

**9.** (a) R explains A.

**10.** (b) formaldehyde. Formalin is ~40% HCHO in water.

**11.** (c) cinnamon. Cinnamaldehyde comes from cinnamon.

**12.** (b) the ring carbon ortho to $O^-$. The ring's C=C π electrons at the ortho carbon attack.

**13.** HCHO: two H atoms, no alkyl group. **Answer: 0**

**14.** The $O^-$ lone pair moves into the ring; the ring C=C at the ortho carbon attacks the HCHO carbon; the C=O π pair moves onto O. After proton transfer the ring carries $–CH_2OH$.

**15.** 1 → (a), 2 → (b), 3 → (d), 4 → (c). Each compound matches its main use.