# Making Aldehydes and Ketones: Methods and Named Reactions

Four routes make both aldehydes and ketones (from alcohols, alkenes and alkynes); named reactions make only one: Rosenmund, Stephen, Etard and Gatterman-Koch for aldehydes; Grignard on nitriles, dialkylcadmium and Friedel-Crafts acylation for ketones.

Name: Date: Score: ____ / 15

## A. Fill in the blanks

**1.** Oxidation of a primary alcohol gives an ____.

**2.** Rosenmund reduction uses $H_2$ over palladium on ____.

**3.** The Etard reaction converts toluene into ____.

**4.** Benzene and RCOCl with anhydrous $AlCl_3$ give an aryl ____.

## B. True or False

**5.** Ozonolysis of an alkene can give aldehydes, ketones or both. True / False

**6.** Hydration of ethyne gives propanone. True / False

**7.** The Stephen reaction goes through an imine. True / False

## C. Assertion and reason

**8. Assertion (A):** Rosenmund reduction stops at the aldehyde.
**Reason (R):** $BaSO_4$ poisons the Pd catalyst.

(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):** Dialkylcadmium converts an acyl chloride into a ketone.
**Reason (R):** R′ replaces Cl on the acyl group.

(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.** Gatterman-Koch reaction uses:

(a) CO + HCl
(b) $CrO_2Cl_2$
(c) $SnCl_2$/HCl
(d) $R_2Cd$

Answer: _____

**11.** A ketone is made from a nitrile using:

(a) $SnCl_2$/HCl
(b) a Grignard reagent, then hydrolysis
(c) $H_2$, Pd–$BaSO_4$
(d) $O_3$

Answer: _____

**12.** Oxidation of a secondary alcohol gives:

(a) an aldehyde

(b) a ketone

(c) a carboxylic acid

(d) an ether

Answer: _____

## E. Numerical problems

**13.** How many named reactions in this topic make benzaldehyde (Etard, Gatterman-Koch)?

## F. Short answer questions

**14.** How would you make acetophenone from benzene?

## 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. Rosenmund | (a) RCOCl, $H_2$, Pd–$BaSO_4$ | 1 → ____ |
| 2. Stephen | (b) toluene, $CrO_2Cl_2$ | 2 → ____ |
| 3. Etard | (c) RCN, $SnCl_2$/HCl, $H_3O^+$ | 3 → ____ |
| 4. Friedel-Crafts acylation | (d) benzene, RCOCl, $AlCl_3$ | 4 → ____ |

## Detailed solutions

**1.** aldehyde

**2.** $BaSO_4$

**3.** benzaldehyde

**4.** ketone

**5.** True. Depends on the groups on the double-bond carbons.

**6.** False. Ethyne gives ethanal; other alkynes give ketones.

**7.** True. RCN → RCH=NH → RCHO.

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

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

**10.** (a) CO + HCl. With anhydrous $AlCl_3$ (or CuCl).

**11.** (b) a Grignard reagent, then hydrolysis. RCN + R′MgX → RCOR′.

**12.** (b) a ketone. 2° → ketone.

**13.** count them. **Answer: 2**

**14.** Friedel-Crafts acylation: benzene + $CH_3COCl$ with anhydrous $AlCl_3$ gives $C_6H_5COCH_3$.

**15.** 1 → (a), 2 → (c), 3 → (b), 4 → (d). Each named reaction matches its reagents.