▶ Video explanation (YouTube Short)

Preparing Aldehydes and Ketones

Four routes make both families; a set of **named reactions** makes only one.

1. Routes for both (NCERT 8.2.1)

Route	Reagent	Gives
Oxidation of alcohols	an oxidising agent	1° alcohol → aldehyde; 2° alcohol → ketone
Dehydrogenation of alcohols	vapour over Cu or Ag, heat	1° → aldehyde; 2° → ketone
Ozonolysis of alkenes	O_3, then Zn dust and water	aldehydes, ketones or both
Hydration of alkynes	dil. H_2SO_4, $HgSO_4$	ethyne → ethanal; other alkynes → ketones

2. Aldehydes only (NCERT 8.2.2)

Reaction	From	Reagents
Rosenmund reduction	acyl chloride RCOCl	H_2 over Pd on $BaSO_4$
Stephen reaction	nitrile RCN	$SnCl_2$/HCl (imine), then H_3O^+
Etard reaction	toluene	CrO_2Cl_2 (chromyl chloride), then H_3O^+ → benzaldehyde
Gatterman-Koch reaction	benzene	CO + HCl, anhydrous $AlCl_3$ (or CuCl) → benzaldehyde

3. Ketones only (NCERT 8.2.3)

Reaction	From	Reagents
Grignard on a nitrile	RCN	R′MgX, then H_3O^+ → RCOR′
Dialkylcadmium	acyl chloride RCOCl	R'_2Cd → RCOR′
Friedel-Crafts acylation	benzene	RCOCl, anhydrous $AlCl_3$ → C_6H_5COR

Solved example

Q. How would you make benzaldehyde from toluene, and acetophenone from benzene?
A. Toluene + chromyl chloride (CrO_2Cl_2), then hydrolysis, gives **benzaldehyde** (Etard reaction). Benzene + acetyl chloride (CH_3COCl) with anhydrous $AlCl_3$ gives **acetophenone**, $C_6H_5COCH_3$ (Friedel-Crafts acylation).

Key takeaways

- Both: alcohols (oxidation, dehydrogenation), alkenes (ozonolysis), alkynes (hydration).
- Aldehydes: Rosenmund, Stephen, Etard, Gatterman-Koch.
- Ketones: Grignard + nitrile, dialkylcadmium, Friedel-Crafts acylation.

Practice questions

1. (MCQ) Rosenmund reduction converts an acyl chloride into: (a) an alcohol (b) an aldehyde (c) a ketone (d) an acid
2. (MCQ) Hydration of ethyne ($HgSO_4$, dil. H_2SO_4) gives: (a) ethanol (b) ethanal (c) propanone (d) ethanoic acid
3. (MCQ) The reagent in the Etard reaction is: (a) CrO_2Cl_2 (b) $SnCl_2$/HCl (c) R_2Cd (d) O_3
4. (Very short) Name the reaction that makes benzaldehyde from benzene, CO and HCl.
5. (Very short) What does oxidation of a secondary alcohol give?
6. (Short) Write the Stephen reaction for CH_3CN.
7. (Short) How is a ketone made from a nitrile?
8. (Application) Give two ways to make propanone.

Answer key

1. (b) an aldehyde.
2. (b) ethanal.
3. (a) CrO_2Cl_2.
4. Gatterman-Koch reaction.
5. A ketone.
6. CH_3CN + $SnCl_2$/HCl → $CH_3CH{=}NH$ (imine); hydrolysis (H_3O^+) → CH_3CHO.
7. React the nitrile with a Grignard reagent (R′MgX), then hydrolyse: RCN → RCOR′.
8. Oxidation (or dehydrogenation over Cu) of propan-2-ol; hydration of propyne ($HgSO_4$, dil. H_2SO_4); also CH_3COCl + $(CH_3)_2Cd$.

▶ Watch the video explanation