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Making Aldehydes & Ketones

how are they made?

4 routes for both

alcohols · alkenes · alkynes

+ named reactions

one set for aldehydes, one for ketones

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Making Aldehydes & Ketones

1, 2: from alcohols

$$RCH_2OH \xrightarrow{[O]} RCHO$$

1° alcohol → aldehyde

$$R_2CHOH \xrightarrow{[O]} R_2C{=}O$$

2° alcohol → ketone

or: dehydrogenation

vapour over Cu or Ag, heat

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Making Aldehydes & Ketones

3, 4: alkenes and alkynes

$$R_2C{=}CR_2 \xrightarrow[\text{(ii) } Zn \,/\, H_2O]{\text{(i) } O_3} 2\, R_2C{=}O$$

ozonolysis

$$\text{ethyne} + H_2O \xrightarrow[\text{dil. } H_2SO_4]{HgSO_4} CH_3CHO$$

hydration: gives ethanal

other alkynes give ketones

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Making Aldehydes & Ketones

aldehydes only

$$RCOCl \xrightarrow[Pd\text{-}BaSO_4]{H_2} RCHO$$

Rosenmund reduction

$$RCN \xrightarrow[\text{then } H_3O^+]{SnCl_2 \,/\, HCl} RCHO$$

Stephen reaction

via an imine, RCH=NH

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Making Aldehydes & Ketones

benzaldehyde

$$C_6H_5CH_3 \xrightarrow[\text{then } H_3O^+]{CrO_2Cl_2} C_6H_5CHO$$

Etard reaction

$$C_6H_6 \xrightarrow[\text{anhyd. } AlCl_3]{CO,\ HCl} C_6H_5CHO$$

Gatterman-Koch reaction

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Making Aldehydes & Ketones

ketones only

$$RCN \xrightarrow[\text{then } H_3O^+]{R'MgX} RCOR'$$

nitrile + Grignard reagent

$$RCOCl \xrightarrow{R'_2Cd} RCOR'$$

dialkylcadmium

$$C_6H_6 \xrightarrow[\text{anhyd. } AlCl_3]{RCOCl} C_6H_5COR$$

Friedel-Crafts acylation

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Making Aldehydes & Ketones

remember

both:

alcohols · alkenes · alkynes

aldehydes:

Rosenmund · Stephen
Etard · Gatterman-Koch

ketones:

Grignard · R_2Cd · Friedel-Crafts