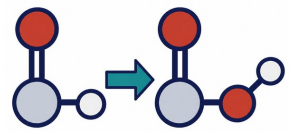
Aldehydes and Ketones Summary Map

AQA A-level Chemistry · 3.3.8 Aldehydes and ketones

1 Oxidising aldehydes 3.3.8

- Aldehyde + [O] → **carboxylic acid**
- H on the C=O carbon is removed
- Ketones: a C–C bond would break
- So ketones **resist** oxidation



2 Telling them apart 3.3.8

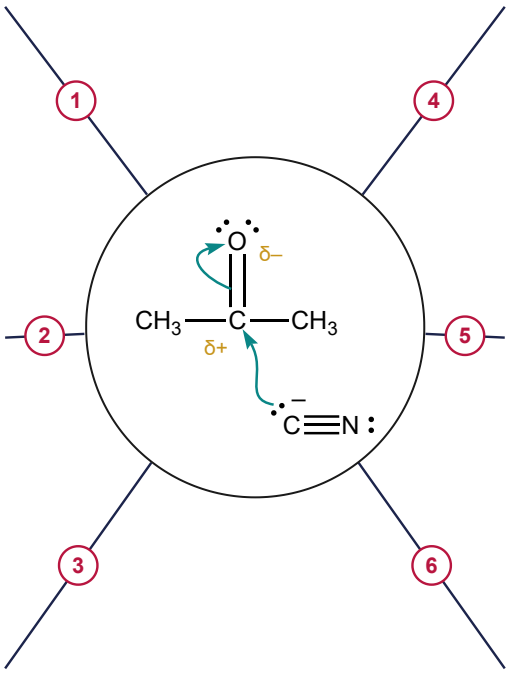
- $Cr_2O_7^{2-}$ / H^+: orange → **green**
- Tollens': **silver mirror**
- Fehling's: blue → **red** Cu_2O
- Ketones: no change



3 Reduction with $NaBH_4$ 3.3.8

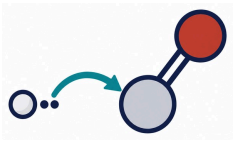
- **$NaBH_4$** in aqueous solution, [H]
- Aldehyde → **primary** alcohol
- Ketone → **secondary** alcohol
- C=C bonds left alone





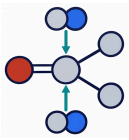
4 The H^- mechanism 3.3.8

- **H^-** attacks the δ+ C
- π pair to O: alkoxide ion
- O^- takes H^+ from water
- **Nucleophilic addition**



5 KCN, then dilute acid 3.3.8

- $:CN^-$ attacks the **δ+ C**
- O^- takes H^+ from the acid
- Overall: HCN adds; chain +1 C
- Planar C=O: **racemic** product



6 KCN hazards 3.3.8

- KCN is **very toxic**
- Acid + KCN releases **HCN gas**
- Fume cupboard, gloves, small amounts
- HCN gas itself is never used



Which tests are positive? ✓ positive result; – no change

Compound	Dichromate(VI)	Tollens'	Fehling's
ethanal, CH_3CHO	✓ green	✓ mirror	✓ red
propanal, CH_3CH_2CHO	✓ green	✓ mirror	✓ red
propanone, CH_3COCH_3	–	–	–
butanone	–	–	–
propan-1-ol	✓ green	–	–
2-methylpropan-2-ol	–	–	–

Worked examples

Identify the unknown

- C_4H_8O, no mirror
- unbranched ketone
- **butanone**

Reduce it

- butanal + 2[H]
- $NaBH_4$(aq)
- **butan-1-ol**

Racemic?

- propanal + KCN, acid
- chiral C: H, OH, CN, C_2H_5
- **50 : 50**: inactive

Aldehydes lead to carboxylic acids and their derivatives in 3.3.9, and carbonyls are identified by NMR in 3.3.15.

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