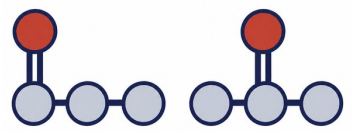
Carbonyl Compounds Summary Map

Edexcel International A Level Chemistry · Unit 4 · Topic 15B Carbonyl Compounds

1 Naming and formulae

15.6

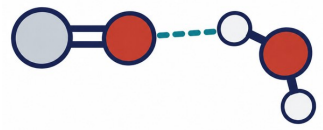
- **Aldehyde**: –CHO at the end, **-al**
- **Ketone**: C=O inside, **-one**
- Lowest number to the C=O carbon
- Structural, displayed, skeletal



2 Forces and solubility

15.7

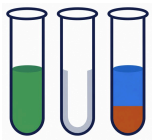
- No H on O: **no hydrogen bonds**
- Polar: dipole–dipole forces
- Boil between alkanes and alcohols
- O lone pair **accepts** from water

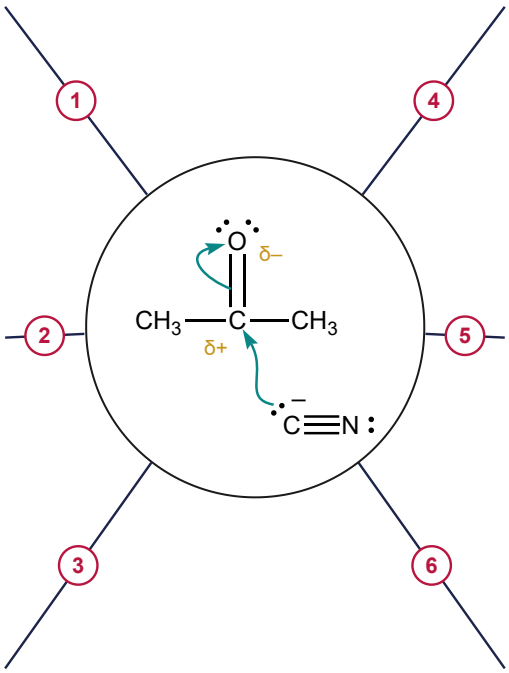


3 Oxidation tests

15.8 i

- $Cr_2O_7^{2-}$ / H^+: orange → green
- Tollens': **silver mirror**
- Fehling's: **red-brown Cu_2O**
- Aldehydes only: ketones resist

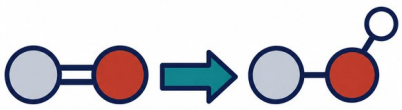




4 Reduction

15.8 ii

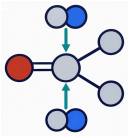
- **$LiAlH_4$** in dry ether, [H]
- Aldehyde → **primary** alcohol
- Ketone → **secondary** alcohol
- Dry: $LiAlH_4$ reacts with water



5 Adding HCN

15.8 iii, 15.5

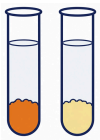
- $:CN^-$ attacks the **δ+ C**
- O^- takes H^+ from HCN
- CN^- regenerated: KCN catalyst
- Planar C=O: **racemic** product



6 2,4-DNPH and iodoform

15.8 iv–v

- 2,4-DNPH: **orange** solid, any C=O
- Derivative **melting point** names it
- I_2/NaOH: yellow **CHI_3**
- Positive: CH_3CO–, $CH_3CH(OH)$–



Which tests are positive?

✓ positive result; – no change

Compound	2,4-DNPH	Tollens' / Fehling's	Iodoform
ethanal, CH_3CHO	✓	✓	✓
propanal, CH_3CH_2CHO	✓	✓	–
propanone, CH_3COCH_3	✓	–	✓
pentan-3-one	✓	–	–
ethanol, CH_3CH_2OH	–	–	✓
propan-1-ol	–	–	–

Worked examples

Identify the unknown

- 2,4-DNPH ✓, Tollens' –
- iodoform ✓, C_4H_8O
- **butanone**

Reduce it

- butanal + 2[H]
- $LiAlH_4$, dry ether
- **butan-1-ol**

Racemic?

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

Carbonyls lead to carboxylic acids and their derivatives in Topic 15C, and are identified by spectra in Topic 15D.

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