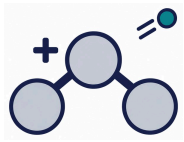
Analysis Summary Map

AQA A-level Chemistry · 3.3.6 Organic analysis

1 The molecular ion

3.3.6.2 i

- M → **M⁺** + e⁻
- Highest m/z: m/z = **Mr**
- High resolution: **4 d.p.**
- Mr alone may fit several formulas



2 Precise masses

3.3.6.2 ii

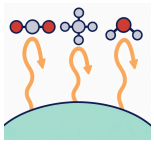
- H 1.0078 · C 12.0000 · O 15.9949
- Add them for each formula
- C_3H_8O: **60.0573**
- $C_2H_4O_2$: **60.0210**

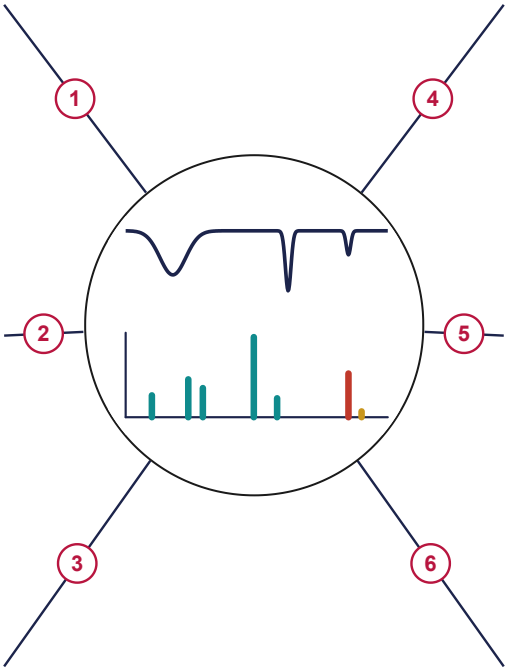


3 Greenhouse gases

3.3.6.3 iv

- The Earth emits **infrared**
- C=O, C–H, O–H bonds absorb it
- **CO_2, CH_4, H_2O**
- Energy kept: **global warming**





4 Infrared absorption

3.3.6.3 i–iii

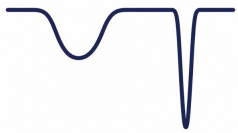
- Bonds **stretch and bend**
- Same frequency IR: absorbed
- Dip = low **transmittance**
- Below 1500: **fingerprint**



5 Reading IR spectra

3.3.6.3 i–iii

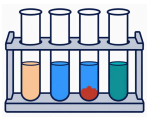
- C=O 1680–1750
- O–H alcohol 3230–3550
- O–H acid 2500–3000, very broad
- Absent bands count too



6 Required Practicals 4 and 6

3.3.6.1 i, RP4, RP6

- Bromine water: **C=C**
- Dichromate: 1°/2° alcohol, CHO
- Fehling's or Tollens': **CHO**; $NaHCO_3$: **COOH**
- NaOH, $BaCl_2$, $AgNO_3$: **ions**



Precise masses and absorptions

precise M⁺ from H 1.0078, C 12.0000, O 15.9949; IR ranges from the Chemistry Data Sheet (cm⁻¹)

Formula	Precise M⁺	Bond	Range / cm⁻¹
C_2H_4O	44.0261	C–H	2850–3300
CO_2	43.9898	C=C	1620–1680
C_3H_6O	58.0417	O–H (alcohol)	3230–3550
C_4H_{10}	58.0780	C=O	1680–1750
C_3H_8O	60.0573	O–H (acid)	2500–3000
$C_2H_4O_2$	60.0210	N–H	3300–3500

Worked examples

Which formula?

- M⁺ at m/z 74.0366
- $C_3H_6O_2$: 74.0366
- **not $C_4H_{10}O$** (74.0729)

Which propanol?

- both C_3H_8O, 60.0573
- oxidise and distil
- Tollens' mirror: **propan-1-ol**

An unknown

- Tollens' mirror; M⁺ 58.0417
- IR 1730; no O–H
- **propanal**

NMR spectroscopy and chromatography follow at A-level (3.3.15, 3.3.16); mass spectra of elements were met in 3.1.1.

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