Beckfoot	Subject: Chemistry	Topic: Organic Analysis	Year Group: 12	enjoy learn succeed

Functional Group Tests

	Functional Group	Test Procedure	Positive Result
1	**1° alcohol**	Distil with potassium dichromate(VI)	Orange to green colour change
2	**2° alcohol**	Reflux with acidified potassium dichromate(VI)	Orange to green colour change
3	**3° alcohol**	Distil with potassium dichromate(VI)	No change
4	**Aldehyde**	1) Warm with Fehling's or Benedict's reagent 2) Warm with Tollens' reagent	1) Brick red precipitate forms 2) Silver mirror forms on the side of the test tube
5	**Ketone**	1) Warm with Fehling's or Benedict's reagent 2) Warm with Tollens' reagent	1) Stays blue 2) Stays colourless
6	**Alkene**	Shake with bromine water	Orange to colourless colour change
7	**Carboxylic acid**	Add a spatula of solid sodium carbonate, bubble through limewater	Fizzing and turns limewater cloudy

Mass Spectrometry

1	**Determining the M_r of compounds**	1. The first species formed is called the molecular ion $[M]^+$ 2. The signal for $[M]^+$ gives the M_r of the compound
2		
3	**High Resolution Mass Spectrometry**	1. Measures the m/z values to enough accuracy to find the molecular formula 2. If the Mr of a compound is measured to several decimal places, it gives a unique molecular formula 3. Where there is more than one compound with the same molecular formula, this technique cannot be used to identify the compounds.

Low resolution M_r	High resolution M_r	Molecular formula	Possible molecules
60	60.0211	$C_2H_4O_2$	CH_3COOH $HCOOCH_3$
60	60.0324	CH_4N_2O	$H_2NCOONH_2$

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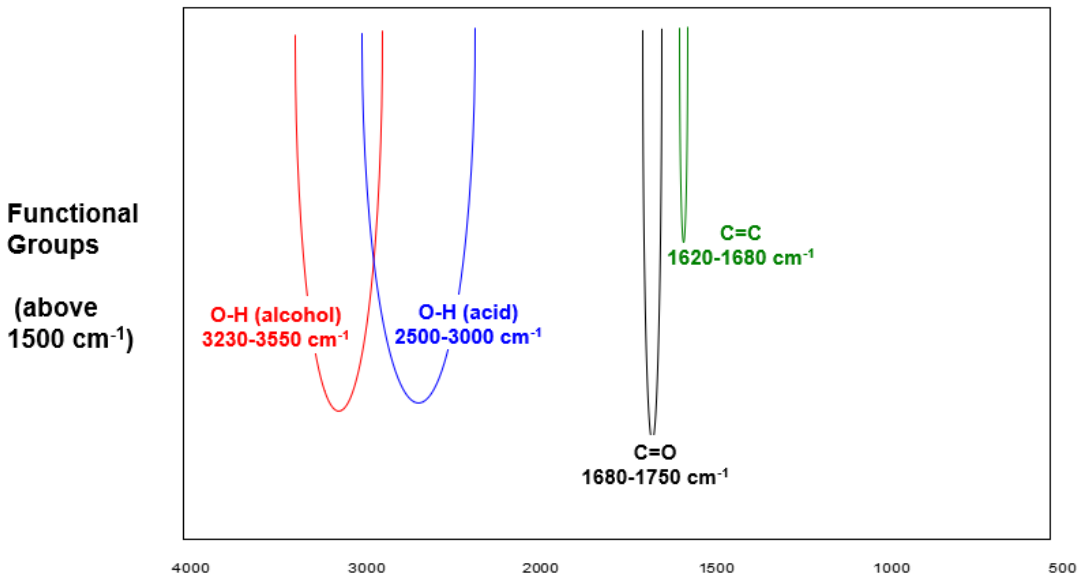
Infrared Spectroscopy		
1	**The basics**	1) A beam of IR radiation is passed through a sample 2) The covalent bonds in the molecules absorb the radiation, increasing their vibrational energy 3) Bonds a) between different atoms and b) in different places absorb different frequencies
2	**The fingerprint region**	1) Below 1500 cm-1 2) Unique to a particular compound 3) An IR spectrum from an unknown can be compared with the IR spectra from known compounds using a database
3	**The IR Spectrum**	1) Above 1500 cm-1 2) Characteristic peaks 
4	**Global warming**	1) The Sun emits mainly UV/visible radiation 2) This is absorbed by Earth's surface and re-emitted as IR radiation 3) Greenhouse gases have bonds that are good at absorbing infrared energy 4) The more IR radiation a molecule absorbs, the more effective a greenhouse gas it is