AQA Chemistry A-level

Topic 3.6 - Organic Analysis

Flashcards

How do you test for alkenes? What is the result?

How do you test for alkenes? What is the result?

Shake with bromine water, result is bromine water is decolourised (orange to colourless)

How do you test for haloalkanes? What is the result?

How do you test for haloalkanes? What is the result?

Add NaOH (aq) and warm, acidify with HNO_3, add $AgNO_3$(aq)

Result: precipitate of AgX (for Cl=white, for Br=cream, for I=yellow)

How do you test for alcohols? What is the result?

How do you test for alcohols? What is the result?

Add acidified $K_2Cr_2O_7$ (potassium dichromate(VI)) and heat

Result: colour change from orange to green for 1^0 and 2^0 alcohols (note: no change for 3^0 alcohols)

How do you test for aldehydes? What is the result? (2 ways)

How do you test for aldehydes? What is the result? (2 ways)

1. Warm with Fehling's solution, result: brick red ppt forms (from blue solution)
2. Warm with Tollens' reagent, result: "silver mirror" (Ag(s) ppt) forms

How do you test for carboxylic acids? What is the result?

How do you test for carboxylic acids? What is the result?

Add $Na_2CO_3(aq)$, result: $CO_2(g)$ given off - effervescence

What is mass spectrometry?

How does it work?

What is mass spectrometry? How does it work?

Used to find the relative molecular masses of organic compounds.

Compound is dissolved in solution, ionised by a high voltage supply (to mostly 1+ ions), accelerated by a negatively charged plate, becomes a beam of ionised molecules, reach detector and cause a current to flow. Time of flight used to work out m/z value and plot graph.

What does the x axis show on a mass spectrum? What does this effectively show and why?

What does the x axis show on a mass spectrum? What does this effectively show and why?

Shows m/z value (mass divided by ionic charge).

Since most ions are 1+, this effectively shows M_r

Why are there multiple peaks when molecules are put into a mass spectrometer?

Why are there multiple peaks when molecules are put into a mass spectrometer?

The molecular ion is shown as a peak, but it will also FRAGMENT into smaller molecules, so these peaks are shown as well

Also, due to isotopes of atoms, different peaks may be seen

How does gas chromatography work and what does it tell you?

How does gas chromatography work and what does it tell you?

A stream of gas carries a mixture of vapours through a column packed with solids, different compounds move through at different speeds, so they are separated. The amount of each compound can then be measured

What does GCMS stand for?

What does GCMS stand for?

Gas chromatography linked to mass spectrometry

What might GCMS be used for?

What might GCMS be used for?

Powerful chemical analysis - forensic work, measuring water pollution, drug testing on athletes, racehorses

What is high resolution mass spectrometry?

What is high resolution mass spectrometry?

Mass spectrometers which give M_r to 3d.p. or 4d.p. are called high resolution (low resolution is to nearest whole number)

What does high resolution mass spec allow you to do?

What does high resolution mass spec allow you to do?

Distinguish between compounds that have the same M_r to the nearest whole number, but are made up of different atoms and therefore have different values of M_r to 3.d.p

Why do atoms and chemical bonds absorb infrared radiation?

Why do atoms and chemical bonds absorb infrared radiation?

They are constantly vibrating - they can absorb infrared radiation that is the same frequency as their frequency of vibration

What effect does a stronger bond have on the frequency of vibration?

What effect does a stronger bond have on the frequency of vibration?

Vibrate faster (with higher frequency)

What effect do heavier atoms have on the frequency of vibration?

What effect do heavier atoms have on the frequency of vibration?

Vibrate slower (with lower frequency)

How does infrared spectroscopy work?

How does infrared spectroscopy work?

Every bond has a unique vibration frequency in the infrared region of the EM spectrum

Bonds absorb radiation that has the same frequency as their frequency of vibration

Infrared radiation emerged from a sample is missing the frequencies that have been absorbed → this information can be used to identify the compound's functional group

What happens inside an infrared spectrometer?

What happens inside an infrared spectrometer?

Beam of infrared radiation with a range of frequencies is passed through the sample

Radiation that emerges is missing frequencies that have been absorbed by the bonds in the sample

Graph is plotted of intensity against frequency of radiation

What do the troughs on an infrared spectrum show?

What do the troughs on an infrared spectrum show?

The frequencies where radiation has been absorbed - match to table to find out which bonds they represent

What is the fingerprint region?

What is the fingerprint region?

Area of the infrared spectrum below wavenumber of 1500cm^{-1}

Many peaks, caused by complex vibrations of the whole molecule. Unique to every compound, so can be used to identify compounds

How is the fingerprint region used to identify compounds?

How is the fingerprint region used to identify compounds?

The fingerprint region's pattern is matched to a database on a computer to identify the compound accurately