OCR (A) Chemistry A-level

Topic 4.2.4 - Analytical techniques

Flashcards

What happens when a molecule absorbs infrared radiation?

What happens when a molecule absorbs infrared radiation?

It makes the covalent bond vibrate more in a stretching or bending motion

What factors affect the amount of vibration of a bond?

What factors affect the amount of vibration of a bond?

- Bond strength
- Bond length
- Mass of each atom in the bond

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 do the peaks on an infrared spectrum represent?

What do the peaks on an infrared spectrum represent?

Absorbance of energy from the infrared radiation

What are the 2 peaks that must be present to identify a substance as carboxylic acid?

What are the 2 peaks that must be present to identify a substance as carboxylic acid?

- Very broad peak at 2500 - 3300 cm^{-1} → O-H group
- Sharp peak at 1680 - 1750 cm^{-1} → C=O group

What happens inside a mass spectrometer?

What happens inside a mass spectrometer?

- Organic compound is vaporised and passed through the spectrometer
- Some molecules lose an electron and forms molecular ions
- Excess energy from the ionisation makes the bonds vibrate more
- Vibration causes bond to weaken
- Molecular ion splits by fragmentation

What is the symbol of molecular ion?

What is the symbol of molecular ion?

M^+

Is fragmentation predictable? Why?

Is fragmentation predictable? Why?

No, because it can happen anywhere in the molecule

In a mass spectrometry how is a molecular ion represented?

In a mass spectrometry how is a molecular ion represented?

It is the peak with the highest mass/charge ratio

The molecular mass of the molecular ion is equal to what?

The molecular mass of the molecular ions is equal to what?

Relative molecular mass of the compound

Will the molecular ion peaks of two isomers of the same compound be same or different?

Will the molecular ion peaks of two isomers of the same compound be same or different?

Same

What is the m/z value of CH_3^+?

What is the m/z value of CH_3^+ ?

15

What is the m/z value of OH^- from alcohol?

What is the m/z value of OH^- from alcohol?

17

What is the m/z value of $C_2H_5^+$?

What is the m/z value of $C_2H_5^+$?

29

What is the m/z value of $C_3H_7^+$?

What is the m/z value of $C_3H_7^+$?

43

What is the m/z value of $C_4H_9^+$?

What is the m/z value of $C_4H_9^+$?

57

What are the advantages of using mass spectrometry? (2)

What are the advantages of using mass spectrometry? (2)

- Cheap
- Small quantities of samples required

What is the main disadvantage of using mass spectrometry?

What is the main disadvantage of using mass spectrometry?

The sample is completely destroyed