**29 Techniques of analysis**

**Topic summary**

**•**  **Paper chromatography (PC)** uses the principle of **partition** to separate components of a mixture.

**•**  Components of a mixture are separated in **thin layer chromatography (TLC)** through the principle of **adsorption**.

**•**  Components are separated in **gas chromatography (GC)** by their relative volatilities and attraction to the non-polar coating on the solid support.

**•**  The routine uses of gas chromatography in analysis include the detection of alcohol, drugs, food additives and impurities and explosive residues.

**•**  Measuring the accurate mass of the molecular ion peak in **mass spectrometry** allows us to work out the molecular formula of a compound.

**•**  Use of the M+1 peak in mass spectrometry enables us to determine the number of carbon atoms in a molecule.

**•**  Use of the M+2 peak in mass spectrometry enables us to determine the number of chlorine and/or bromine atoms in a molecule.

**•**  The **fragmentation pattern** in mass spectrometry helps us to determine the structure of molecules.

**•**  **Infrared (IR)** spectroscopy can identify the functional groups within a molecule.

**•**  **Nuclear magnetic resonance (NMR)** spectroscopy can be carried out on compounds that contain atoms such as 13C and 1H, which have magnetic moments that take up orientations with different energies in an external magnetic field.

**•**  Both the **chemical shift** (δ) values and the splitting patterns in a 1H NMR spectrum allow us to determine the structures of molecules.

**•**  The 13C spectrum can allow us to determine the number and environment of carbon atoms within a molecule.