Technique	***Principle***	***Typical analytes***	***Comment***
Atomic Emission Spectroscopy	Identification of sample based on emission lines caused by valence electrons returning from an excited state to ground state.	Metals	Quantitative and qualitative. Calibration curve needed for quantitative.
Atomic Absorption Spectroscopy	Identification of sample based on absorption lines caused by valence electrons moving from ground state to an excited state.	Metals	Quantitative and qualitative. Calibration curve needed for quantitative.
UV-Visible Spectroscopy	Used to measure concentration of analytes by measuring the absorption of a chosen band of wavelength by bonding and non-bonding valence electrons to jump to excited state.	Organic molecules with relatively low molecular mass and transition metals	Quantitative. Concentrations of an analyte can be determined. Preparation of calibration curve is necessary. Calibration curve needed.
Infra Red spectroscopy (IR)	Absorption of infrared radiation by bonds in order to stretch or bend. Wavelength absorbed depends on the mass of atoms on either side of the bond and the strength of the bond. IR radiation is not sufficient to excite electrons.	Organic molecules	Mostly qualitative. Identification of analytes can be made by comparing the fingerprint region of the spectrum to data base of samples.
Mass Spectrometry (MS)	Destructive technique by bombarding with high energy electrons to produce charged fragments.	Elements and organic compounds that can be vapourised without decomposing.	Very sensitive and expensive. Is both a quantitative and qualitative technique. Calibration curve needed. For quantitative analysis the peak of a chosen ion particle, belonging specifically to the molecule under investigation, is chosen.
NMR	Excitation of nucleons to higher energy state using radio waves	Organic molecules	Mainly qualitative. Used to determine organic structures. Very expensive
HPLC	Separating technique based on liquid mobile phase under pressure.	Medium to high molecular mass organic molecules	Extremely sensitive qualitative and quantitative technique especially when coupled with MS and or UV-visible. Calibration curve needed
GC	Separating technique based on gas mobile phase and liquid stationary phase	Low organic molecules in the range of 2- 800 molar mass	Extremely sensitive requires very small sample. Quantitative and qualitative technique especially when coupled with MS and or UV-visible. Calibration curve needed
Volumetric	Reaction of solutions using titration techniques.	Acids, bases, oxidants and reductants in, say, household cleaning products or in contaminated water.	Very cheap. Suitable for relatively high concentration solutions and large sample needed.
Gravimetric	Precipitating and weighing the analyte.	Most compounds that can form a precipitate.	Very cheap. Suitable for relatively high concentration solutions and large sample needed.