

Solutions

2.1 Lilac.

2.2 Dilute hydrochloric acid, then barium chloride solution.

2.3 The concentration of the metal – more intense lines, more of it.

3.1 Add dilute nitric acid to acidify; then silver nitrate solution; a yellow precipitate of silver iodide confirms iodide.

3.2 A green flame suggests copper(II); but another metal's colour could mask or be masked in mixtures, so the flame test alone is not conclusive; copper(II) should give a blue precipitate with sodium hydroxide – the absence suggests a possible error, so repeat with fresh solution; confirm with flame emission spectroscopy, which separates the contributions of mixed metals.

3.3 Spectroscopy is far more sensitive – detects tiny concentrations a flame test misses; it works with mixtures, because each metal's lines sit at their own positions, whereas flame colours can mask each other. It is also rapid and gives concentration from line intensity.