slightly easier to detect them. For example, copper carbonate is a green substance which when heated decomposes to give *black* copper oxide and carbon dioxide. Also, when zinc carbonate, a white substance, is heated, it forms the *lemon-yellow* zinc oxide and carbon dioxide. These two reactions are shown below:

$CuCO_3$ (s) → CuO (s) + CO_2 (g)

$ZnCO_3$ (s) → ZnO (s) + CO_2 (g)

*Testing for **halides***: When we add dilute nitric acid and silver nitrate solution to an unknown solution, the appearance of a precipitate tells us what halide ion is present. Chloride ions give a white precipitate; bromide ions give a cream precipitate and iodide ions give a pale yellow precipitate. The ionic equation for this is, where X^- is the halide ion:

Ag^+ (aq) + X^- (aq) → AgX (s)

*Testing for **sulphates***: Adding hydrochloric acid followed by a barium chloride solution to sulphate ions in solution produces a white precipitate (barium sulphate, an insoluble salt). The ionic equation for this is shown:

Ba^{2+} (aq) + SO_4^{2-} (aq) → $BaSO_4$ (s)

*Testing for **nitrates***: The test for ammonia (see Testing for Positive Ions above) is used again here. We add sodium hydroxide to a solution of the unknown substance and gently warm it. If no ammonia is detected, we add some aluminium powder. This reduces the nitrate ions to ammonium ions. These react with the sodium hydroxide to produce ammonia gas, which is given off. This is detected using damp red litmus which will turn blue.

Testing for Carbon=Carbon Double Bonds

Unsaturated hydrocarbons elkenes will react with bromine water to give a colourless compound Unsaturated hydrocarbons contain (C=C), so this is a good test to detect them. It is the basis for detecting C=C bonds in unsaturated oils and fats.