

Separation Techniques

1. SOLID & LIQUID

(a) If the solid has not dissolved in the liquid (i.e. is suspended in the liquid), the two substances can be separated by **FILTRATION**.

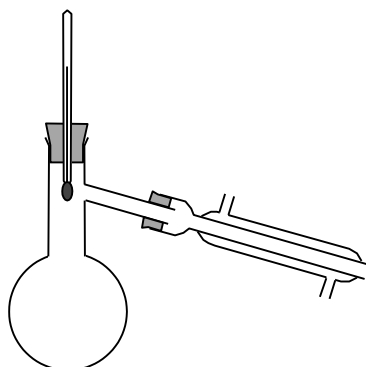
The liquid **filtrate** passes through, the undissolved solid **residue** stays on the paper.

(b) If the solid has dissolved in the liquid, forming a solution:-

(i) If only the solid is required, it is obtained by **EVAPORATION**.

(ii) If the liquid is required, it is obtained by **DISTILLATION**. The solution is placed in a flask and heated. The liquid evaporates, and its vapour passes into a condenser, where it cools and turns back to liquid. (The solid remains behind in the flask as a residue).

Note – The thermometer bulb should be at the level of the condenser.



2. LIQUID & LIQUID

(a) **Immiscible liquids** - by using a **SEPARATING FUNNEL**

When two liquids do not mix (e.g. paraffin and water), they can be separated simply by running off the denser liquid from a separating funnel by opening the tap.



(b) **Miscible liquids** - by **FRACTIONAL DISTILLATION**

Both liquids evaporate, and their vapours pass into a fractionating column, where they are condensed and re-boiled many times. The vapour of the liquid which has the lower boiling point, emerges from the top of the column first, and passes into the condenser.

When all of this liquid has distilled, it is followed by the liquid having the higher boiling point.

3. **SOLID & SOLID** Usually one of the following methods can be used:-

(a) **DISSOLVING:** Find a solvent that will dissolve one solid but not the other. It is often necessary to heat in order to help the process of dissolving. Then filter, wash the residue on the filter-paper with a little of the solvent, and dry it. To obtain the second solid (now in solution, in the filtrate), evaporate the filtrate, as in 1(b)(i) above.

(b) **CHROMATOGRAPHY:** This is a method for separating two solids that are both soluble in the same solvent. Find a solvent that will dissolve both solids, make a solution of the mixture and place two drops of the solution on a piece of filter-paper.

Allow a suitable liquid to spread gradually across the paper.

The solid that is more soluble in the liquid will move through the greatest distance, and the solid that is least soluble will move least.

Thus the dissolved solids are separated on the

