

# Crystallisation

## 1. Definition:

Crystallisation is a separation technique that is used to separate a solid that has dissolved in a liquid and made a solution

2. To obtain pure crystals of hydrated salt from a metal carbonate or metal oxide.

Example: To make crystals of hydrated Cobalt(II) chloride(  $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ )

Step1: Pour the acid into the beaker and warm it gently. [Remember that warming the acid speeds up the reaction.]

Step2: Add a measured amount of the carbonate to the acid with a spatula and stir it with a glass rod. [It is stirred with a glass rod and not the spatula because spatula which is made of metal might react whereas the glass does not react.]

Step3: The step 2 is repeated till no more cobalt carbonate reacted. {The student knows when no more cobalt carbonate will react when solid cobalt chloride is visible or when there is no more fizzing or no more gas formed [Note you cannot mention colour change as a reason]}

Step4: The mixture is then filtered or decanted to remove the (unreacted) excess cobalt carbonate.

Step5: The filtrate is then heated (evaporated) until the crystallisation point is reached. [You come to know when the crystallisation point has reached when crystals start forming on the edge of the glass rod]. It is then left to cool in an evaporating dish.

Step 6: When crystals form, filter off the crystals. Dry the crystals by pressing them between filter papers or drying them in oven at low temperatures.

### Note

1. If cobalt chloride crystals are heated then the water is lost (crystals get dehydrated) and cobalt chloride becomes anhydrous and turns blue. [Rejected answer: To write that the crystals will break or a powder will form if crystals are heated]

2.If instead of cobalt carbonate, magnesium carbonate would have been used, then warming the acid is not needed as magnesium carbonate reacts quickly at room temperature and no heat is needed.

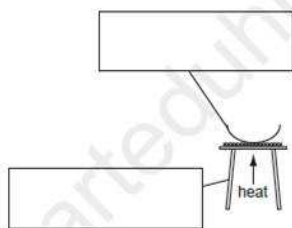
3. Note that the acid should never be in excess as this will make the solution acidic and not neutral and thus the salt will be impure.

4.Excess oxide/carbonate is added to ensure that all the acid is neutralised ( used up)

5.When a metal carbonate is formed, water + carbon dioxide are the byproducts. Carbon dioxide causes bubbling during the reaction, and can be detected using limewater.

6.Crystals are dried using filter paper (and not heat) to prevent the breakdown of the crystals.

- a. If you are asked in general how to obtain salt crystals quickly, then the obvious answer will be to heat/evaporate till the crystallisation point is reached or till it is saturated.



Saturated solution: It is a solution in which no more of the solute dissolves.