• **SUBLIMATION** (quick link to video : sublimation)

Sublimation is the process whereby a solid passes into the vapour phase without first melting. Even though it may be low, a solid does exert a vapour pressure and vaporization directly to the gas phase does occur. There are a number of relatively high melting compounds that exert an appreciable vapour pressure at 1 atmosphere, and if this pressure exceeds 760 mm. Hg at a temperature below the melting point, no liquid state will exist at that pressure *e.g.* solid CO₂. Such solids at temperatures near or below their melting point can be separated from non-volatile substances by sublimation. This process will be favoured by reducing the pressure below 1 atmosphere, and vacuum sublimation is a useful method of purifying a volatile solid if the contaminants are high molecular weight materials.

An apparatus is used that incorporates a cold surface of fairly high surface area, a so-called "cold finger" held close to the material to be sublimed. The system is evacuated and the solid material warmed gently. After the sublimation is complete, the solid is scraped from the cold finger with a spatula. Sublimation is most useful in the case of very small samples, as mechanical losses can be kept very low. The example shown below uses a simple flask. In practice it would be better to use a vacuum flask so that it has a vent if it is heated or it can be evacuated if it is connected to a vacuum line or an aspirator. Remember that you should never heated a sealed vessel - that could cause an explosion.



The sublimation set up before (left) and after (right)



Cold finger after sublimation.

Note the sample crystals that look like thick frost on the upper half.