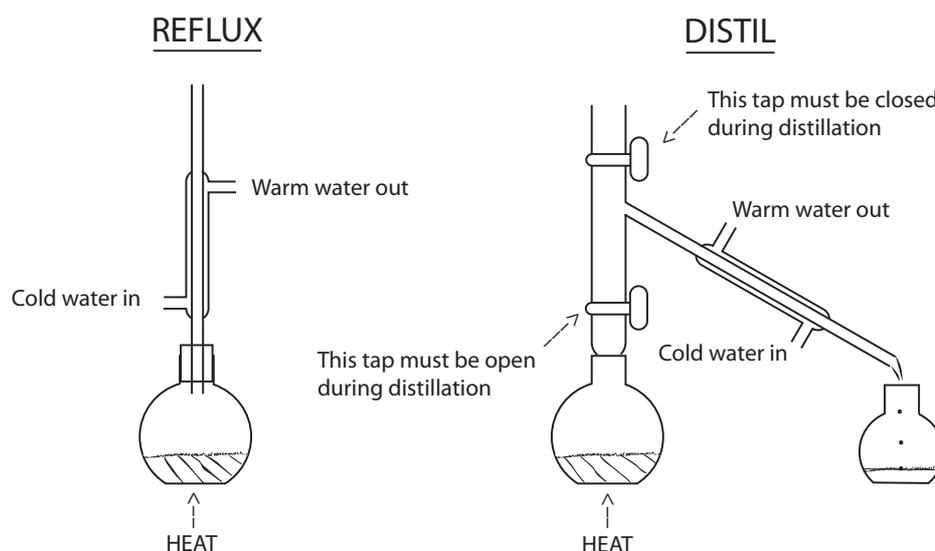


A Second Year Blog on the difference between “Distil” and Reflux” (for the week commencing the 1st of December 2019)

- **Distillation** : When you separate two (or more) mixed liquids by distillation, you heat the mixture until the liquid with the lower (or the lowest) boiling point starts to boil – and it would not matter how much heat you then put into the mixed liquids, **the temperature would remain at the boiling point of the liquid with the lower/the lowest boiling point until all that liquid had boiled off**. The diagram on the right on the next page shows you how to cool/condense/and collect the substance that has boiled off.
- **Reflux** : In contrast, in “Refluxing”, **the vapour of the liquid that is boiling off is cooled/condensed/and RETURNED to the mixture**. It is not allowed to escape from the mixture! The reason for this is that for certain reactants to react, they may need to be heated with each other for a fairly LONG PERIOD OF TIME (say for one hour) so that all the reactant molecules have a chance to collide with each other **with sufficient energy**, and thus react with each other. However, if the reactants were allowed to separate (by distillation) before they had collided with sufficient energy, then only a small proportion of the reactants would react, and in order to prevent the liquid with the lowest boiling point from being distilled off, **its gaseous vapour must be condensed and returned to the mixture continuously** so that ALL the reactants can react. This process is called *refluxing*.
- **In Refluxing, a stopper must NOT be placed in the reflux tube otherwise there WILL be an explosion and you will be showered with fragments of broken glass and scarred and possibly even blinded!**



- It is however important to understand that in refluxing, *the TEMPERATURE of the reactants will never rise above the boiling point of the liquid with the lowest boiling point*, because whatever heat is injected into the mixture will be used to convert that liquid into a gas. As the gas is then condensed and returned to the mixture, the gas will give up its energy to the cold water in the water jacket. The temperature in a reflux operation will thus always be set by the boiling point of the liquid with the lowest boiling point in the mixture.
- If you wanted to achieve a higher temperature (and thus give the colliding reactant molecules much more energy), then the only way of doing so would be to heat the reactants in a chemical “bomb”¹ this being a metal canister with very thick walls that are capable of withstanding very high pressures when heated (usually in an oven) – and for some reactions it will be necessary to use a “bomb”, but because the process is dangerous, your teacher will NOT allow you to do that at school (but you will be allowed to do so when you get to University). [*Heating in a “bomb” is required knowledge for one of the reactions of a Halogenoalkane – even though you will NOT be allowed to carry out the experiment in your school lab.*]

¹ I personally do not like violence, therefore I do not like the name “bomb”, and I would prefer it if the name were changed to “high pressure containment vessel”.