

- **REFLUX and the REFLUX CONDENSER**



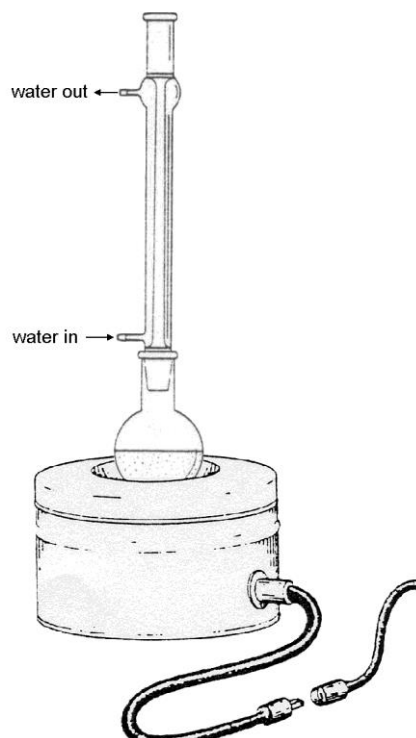
**ALWAYS** makes sure the hoses are securely attached to the condenser.

A **GENTLE FLOW** of cooling water is all that is needed. As long as the condenser feels cool to the touch then it is doing its job.

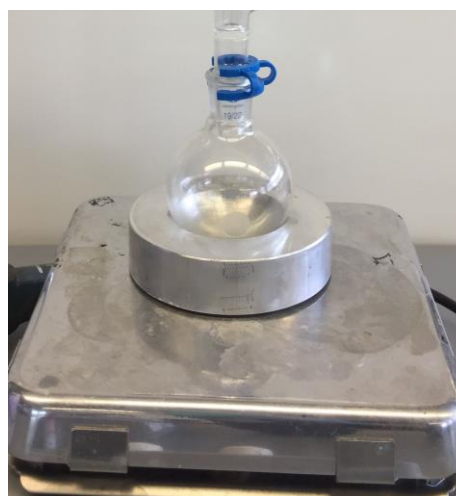
**Check regularly for leaks !**

Organic chemists often need to heat a mixture for an extended period of time and be able to leave it relatively untended. This type of apparatus will be required for several experiments in CHEM353.

The "reflux apparatus" shown allows such heating; it allows the reaction to be carried out at the boiling point of the solvent and yet it prevents loss of solvent or reagent due to evaporation. A condenser is attached to the boiling flask (a round bottom flask) and is clamped in an upright position, the "reflux position", and cooling water is circulated to cause the vapours to condense as they rise up the condenser and thus prevent the vapours from escaping. The upper level of the vapours in the condenser can often be seen as a reflux line. The direction of flow of the water should be such that the condenser fills with the cooling water; requiring that water enters the condenser at the **bottom** and leaves from the **top**. It is usually a good idea to secure the hoses with a twist of copper wire, a hose clamp or a zip tie. A gentle flow of water through the condenser is enough to ensure adequate cooling.

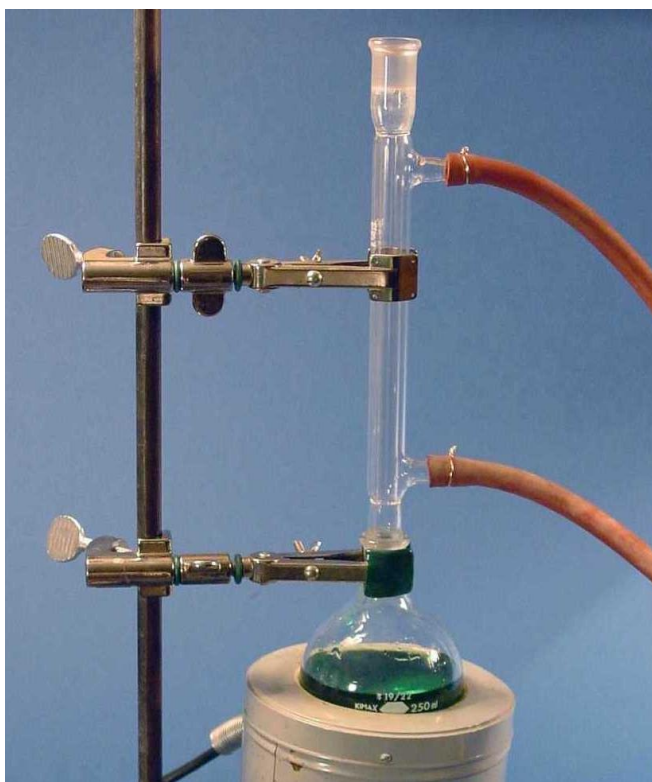


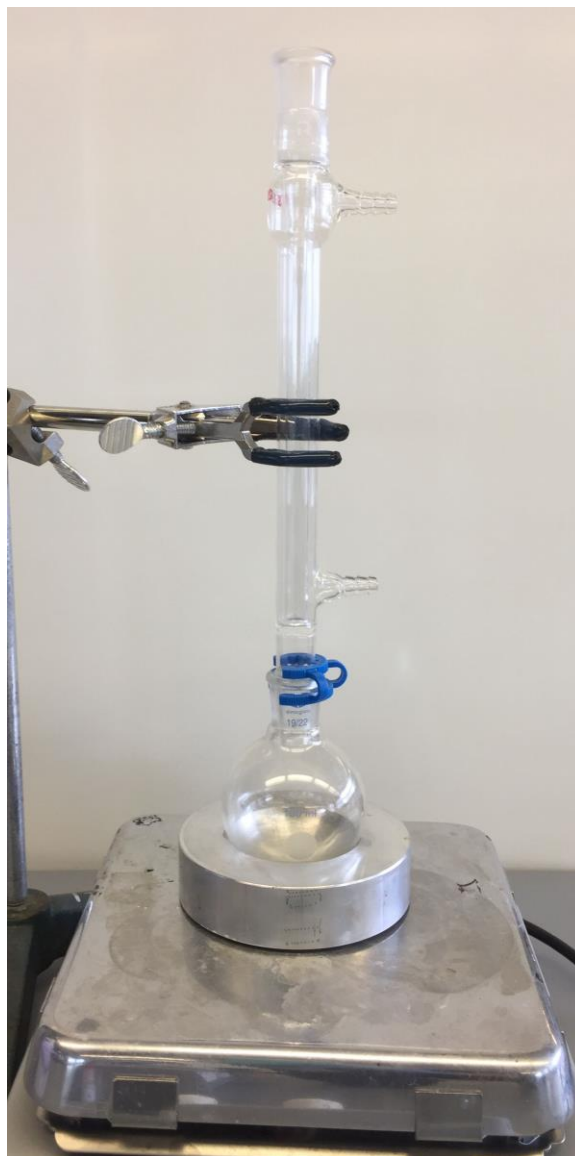
**NOTE:** In the equipment set up sketch shown above, a heating mantle with a heating controller is being used to heat the round bottom flask. In your equipment set up, the heating mantle and heating controller will be replaced by an engineered (shaped) aluminium block (circular) sitting on the top of a stirrer hot plate, see the picture to the right. This is a more modern version of a heating mantle with some distinct benefits.



The photograph shown below has the equipment needed and a typical traditional set-up using a heating mantle and heating controller (you will substitute those for a heating block and a hot plate stirrer). When setting up to heat up a reaction, it is usually a good idea to ensure that the heating source can be easily removed either by raising the set up and / or using a laboratory jack or ensuring that the assembly can be lifted out of the heating apparatus. This allows one to quickly stop the heating process if necessary.

This [YouTube video](#) illustrates the importance of the reflux set-up.





This photograph shows the partial set up to be used : a round bottomed flask in a heating block on a hot plate stirrer. The condenser has been inserted and stabilized with a clamp but the water hoses still need to be attached.