

Standard Operating Procedure for Cryocooler:

A **Cryocooler**¹ is a standalone cooler, usually used to cool some particular application to cryogenic temperatures.

For our laboratory purpose, we use cryocooler to cool down reaction temperature below 0 °C to ~ -80 °C. Before you use the machine make sure you are absolutely sure about the temperature you need for your reaction and the solvent you want to use for cryocooler. Isopropanol: methanol (4:1) is the best solvent to keep the cryocooler temperature constant. You can use acetone, methanol or just isopropanol as your cryocooler solvent depending upon the temperature you need.

- Before you start your reaction, set the cryocooler in the fume hood properly. Make sure your dewar is perfectly balanced over the stir plate and the cryocooler coil is below the solvent level in dewar and hold the cryocooler coil tightly with clamps. Do not use excess solvent in dewar, make sure your coil is fully inside the dewar solvent.
- Switch on the cryocooler, put the temperature probe inside the solvent. You need at least 1 hr to get the constant temperature. Plan your experiment accordingly. Once temperature gets constant, you can set up your reaction vessel inside the dewar.
- Don't rotate the temperature knob frequently. It needs time to show the actual temperature on the digital thermometer. If you want to change the temperature, slowly rotate the temperature knob, wait for some time to get the constant temperature. Improper use may damage the machine permanently.
- Once you are done with the experiment, remove the reaction flask, switch off the cryocooler, unplug it and keep it inside the fume hood for 30-45 mins to warm it in room temperature. Don't try to remove the dewar or the solvent until it is in room temperature. It can cause severe burn to skins in such low temperatures (If you get burned, immediately wash with water and ask someone for help). Once cryocooler temperature comes down to room temperature, remove the solvent from dewar in appropriate waste (You can recycle the solvent, but make sure you are keeping the solvent in proper container and use the recycled solvent only for this cryocooler purpose). Put the cryocooler in appropriate place in the lab.
- If you are planning to use overnight, before you do the reaction, make sure everything works fine. Check with the person who used the machine last. Don't leave it unless you get the constant temperature. Always try to use fresh solvent for overnight reactions.
- It's always better to ask someone if you are not sure. Improper use may ruin your reaction as well as stop other persons work. Before you use the machine, make sure you know the procedure well.

1. <http://en.wikipedia.org/wiki/Cryocooler>

