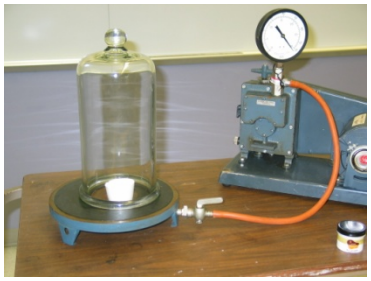
Boiling – A Freezing Process?



Purpose: To demonstrate that reducing air pressure over water low enough results in boiling, cooling and, eventually, freezing.
Location: Room 136: bell jar & vacuum pump on wooden cart; Bottom of Styrofoam cup and eyedropper on shelf P3

Use an eyedropper to cover the bottom of the bottom-part of a Styrofoam cup (about 2 droppers-full) and place it under the bell jar without covering the hole in the center of the base. Connect the bell jar to the vacuum pump with the valve at its base open (i.e. handle aligned with the tubing) and the thumbscrew valve on the top of the vacuum pump (just beneath the pressure gage) closed. (1st photo) Turn the vacuum pump on and observe the water boil, then start to freeze about 6 or 7 minutes after reaching "full" vacuum (2nd photo). The water should be frozen nearly solid in about 10 minutes. Shut the pump off and slowly open the release valve on the vacuum pump. You may remove the bell jar top only after the pressure inside it has reached atmospheric. (This may be difficult. Use both hands and be patient!) Dump the ice into your hand and hold it up to show the students (3rd photo).