“Wet” Dry Ice

The phase diagram for carbon dioxide shows that CO2 can exist only as a gas at ordinary room temperature and pressure. To observe the transition of solid CO2 to liquid CO2, you must increase the pressure until it is at or above the triple point pressure.

Purpose

* Identify phase changes in relation to a phase diagram.
* Observe the melting of carbon dioxide and the relationship to pressure changes.
* Identify and record observations as carbon dioxide changes phases.

Materials

4–5 g CO2 as dry ice

forceps

plastic pipets, 5 mL

pliers

scissors

transparent plastic cup

watch glass

**Always wear safety goggles and a lab apron to protect your eyes and clothing.** If you get a chemical in your eyes, immediately

flush the chemical out at the eyewash station while calling to your teacher. Know the locations of the emergency lab shower and the eyewash station and the procedures for using them.

**Do not touch any chemicals.** If you get a chemical on your skin or clothing, wash the chemical off at the sink while calling to your teacher. Make sure you

carefully read the labels and follow the precautions on all containers of chemicals that you use. If there are no precautions stated on the label, ask your teacher what precautions you should follow. Do not taste any chemicals or items used in the laboratory. Never return leftovers to their original container; take only small amounts to avoid wasting supplies.

Procedure

* 1. Obtain 2–3 very small pieces of dry ice from the teacher and carry back to your lab station using the watch glass.
	2. Place the pieces of dry ice on the table, and observe them until they have completely sublimed. Identify which the procedure step you are working on, and record at least three observations you notice in the data section of your lab report. **Caution:** Dry ice will freeze skin very quickly. Do not attempt to pick up the dry ice with your fingers.
	3. Fill a plastic cup with tap water to a depth of 4–5 cm.
	4. Carry your pipet to the dry ice station to obtain an additional sample. With help from the teacher, use forceps to carefully slide 8–10 pieces of dry ice down the stem and into the bulb of the pipet.
	5. Use a pair of pliers to clamp the opening of the pipet stem securely shut so that no gas can escape. Use the pliers to hold the tube and to lower the pipet into the cup just until the bulb is submerged. From the side of the cup, observe the behavior of the dry ice. Once again, identify which procedure step you are working on and record at least three new observations in your data.
	6. As soon as the dry ice has begun to melt, quickly loosen the pliers while still holding the bulb in the water. Observe the CO2 and record your observations in your data.
	7. Tighten the pliers again, and record your observations.
	8. Repeat Procedure steps 6 and 7 as many times as possible.

DISPOSAL

* 1. Clean all apparatus and your lab station. Return equipment to its proper place. Dispose of chemicals and solutions in the containers designated by your teacher. Do not pour any chemicals down the drain or place them in the trash unless your teacher directs you to do so. Wash your hands thoroughly before you leave the lab and after all work is finished.


# Analysis

1. Compare and contrast sublimation vs. melting.
2. Identify the phase change that occurs when the dry ice is placed on your lab station in step one of your procedure. How do you know this?
3. Identify the phase change that occurs when the dry ice is in the pipet and sealed with the pliers. How do you know this?
4. What purpose(s) do you suppose the water in the cup served? Explain why the water is necessary in this step.
5. What might have happened if too much dry ice (20 or 30 pieces, for example) had been placed inside the pipet bulb? How quickly would the process have occurred?