

CLOUD CHAMBER ACTIVITY

LAB NR 5

From Flinn CHEM FAX #8807.

INTRODUCTION

Radiation is around us all the time. It is in the air we breathe, the water we drink, and the ground we walk on. It is even in the lantern we use when camping. It is important to realize that we will not do anything to create the particles seen in this activity. They are present naturally. We will create an environment that will allow us to see their path as they escape from the lantern mantle. The cloud chamber, also known as a fog chamber, shows the path of the charged particles. A vapor is cooled to a temperature just below its condensation temperature. As a high-energy particle passes through the vapor, ions are created and condensation is initiated on these ions. The alcohol particles or droplets formed in the path of the particle are visible.

The condensation track could be photographed to obtain a permanent record.

PURPOSE

The purpose of this experiment is to observe the path traveled by charged radioactive particles.

EQUIPMENT/MATERIALS

cloud chamber	empty wash bottle for alcohol
blotting paper viewer	large beaker
radioactive source (lantern mantle)	strong light source (flashlight)
methanol, 500 mL	Beral pipet or medicine dropper
dry ice	wooden splints or glass stirring rods
gloves	

SAFETY

- Always wear safety glasses in the lab.
- Dry ice should be handled with insulated gloves.
- Use caution handling methanol because it poses a fire hazard.
- The radiation level produced by the radioactive source is *very* low (less than 0.1 μCi). Therefore, no special safety precautions need to be taken. However, it is still recommended that you wash your hands after handling the mantles and avoid inhaling mantle dust.

PROCEDURE

1. Place the blotting paper inside the large beaker. Use the Beral-type pipet or medicine dropper to soak the blotting paper with methanol.
2. Transfer the blotting paper inside of the cloud chamber.
3. Place the lid on the cloud chamber.
4. Place the cloud chamber on the dry ice.
5. Partially insert the radioactive source into the hole in the side of the cloud chamber. This can be done by pushing the white side of the lantern mantle through the hole with your hands. Use the wooden splint to insert the mantle completely into the cloud chamber.
6. Focus the light through the cloud chamber.
7. Observe the cloud “trails” against the black bottom of the cloud chamber.