



MAKING A CLOUD CHAMBER

TO DETECT COSMIC RAYS

Cosmic rays are high-energy particles from space. A cloud chamber lets us see their tracks as tiny trails in a cloud.

Date: _____

Name: _____

Age: _____

MATERIALS

- 1 clear plastic container with lid (about 30 x 20 x 12 cm / 12 x 8 x 5 in)
- 1 black foam board or black cardstock (cut to fit the bottom)
- 1 piece of felt or thick fabric
- Isopropyl alcohol (rubbing alcohol, 70% or higher)
- Dry ice (sublimation or pellet form)
- Hot water
- Thermometer (optional)
- Flashlight or bright LED light
- Tongs or thick gloves (for handling dry ice)
- Timer or watch



SETUP OVERVIEW

1. Cool the chamber with dry ice.
2. Alcohol evaporates and cools the air.
3. Water vapor condenses into tiny droplets.
4. Charged particles (cosmic rays) leave tracks in the droplets that we can see.



SAFETY FIRST

- Dry ice is extremely cold (-78 °C / -100 °F). Do not touch it with bare hands.
- Use tongs or wear thick gloves.
- Use isopropyl alcohol in a well-ventilated area. Keep away from flames.
- Do not seal the container airtight while dry ice is inside. Gas needs to escape.
- Ask an adult for help.

PROCEDURE

1. Line the bottom of the container with black foam board or cardstock. This makes tracks easier to see.
2. Place the felt or fabric inside the container.
3. Pour about 1-2 cm (½-¾ in) of hot water into the container (just enough to wet the felt). The water should not touch the top.
4. Pour a small amount of isopropyl alcohol (about 5-10 mL) evenly over the felt.
5. Put several pieces of dry ice into a bowl or container. Place the bowl inside the cloud chamber (on the felt). Do not let meltwater spill.
6. Quickly close the lid and seal most of the gap, leaving a small opening for air to escape.
7. Shine the flashlight or LED light through the side of the chamber (across the bottom).
8. Wait 1-2 minutes for the chamber to cool and the cloud to form.
9. Once the cloud is visible, watch carefully. You may see faint thin lines appear and fade. These are particle tracks!
10. Observe for 10-20 minutes. Replace dry ice when the cloud disappears.
11. Try your experiment in different locations (inside, outside, different floors) and compare.



TIP

Patience helps! The chamber may take a few tries to get the right temperature and cloud density.

RECORD YOUR OBSERVATIONS

Date & Time: _____

Location: _____

Temperature (if measured): _____ °C / °F

How long did you observe? _____ minutes

What did you see?

SKETCH WHAT YOU SAW

WHAT'S HAPPENING?

Cosmic rays from space constantly hit Earth. When a high-energy particle passes through the supersaturated vapor in the chamber, it ionizes the air along its path. Water vapor condenses on these ions, forming a tiny line of droplets. We see this line as a track.

Different particles make tracks of different lengths and thicknesses. Most tracks fade after a short time.

You are seeing radiation from outer space with your own eyes!

