

Comet in the Freezer



Cook up a Comet at Home!

Comets are small, icy bodies that orbit the Sun. They spend most of their time in the cold outer regions of our solar system as frozen relics of the material that formed the Sun and planets. Every once in a while, a comet comes near the Sun, heats up, and forms a tail of ice and dust that makes a spectacular show in the night sky. Comets give us clues about how Earth was formed and about the chemical activity at the time life originated. They play an ongoing role in the evolution of life on Earth.

Comets are sometimes called “dirty snowballs” and are made of interstellar ice, dust, and rock. The ices are frozen water (H_2O), ammonia (NH_3), and a number of organic compounds such as carbon monoxide (CO), carbon dioxide (CO_2), methane, (CH_4), ethane (C_2H_6), formaldehyde (CH_2O), alcohols (methanol and ethanol), long-chain hydrocarbons, and amino acids. Comets are held together by gravity.

“Clues from Comets,” the live demonstration at Griffith Observatory, teaches a number of fundamental physical and chemical concepts that are aligned with the California State Standards.

MATERIALS AND COMET INGREDIENTS

- large mixing bowl
- large resealable bag
- water
- sand
- crushed charcoal (regular, not insta-light)
- glass cleaner (ammonia)
- corn syrup (optional)
- duct tape
- rubber bands
- paper towels for clean-up

PROCEDURE

1. Place an empty resealable bag in the empty mixing bowl. Add, in order, the following ingredients

- 1 cup of water
- 3 spoonfuls of sand
- 3-4 spoonfuls of crushed charcoal
- 3-5 squirts of glass cleaner (ammonia)
- a splash of corn syrup



PROCEDURE CONTINUED ON THE NEXT PAGE...

PROCEDURE CONTINUED...

2. Seal the bag tightly. To help your comet freeze into a round shape, loosely tie a rubber band around the middle of the resealable bag. Next, use duct tape to connect the bottom corners of the bag to the top of the bag, as pictured.

3. Allow your comet to freeze in the freezer for at least eight hours.

4. Tear the bag open. You've made a comet!



DISCUSSION

- Water is the primary ingredient of comets and is a necessary ingredient for life as we know it.
- The sand and charcoal represent the rock and dust in the comet. Comets are surprisingly dark—as dark as charcoal! This is contrary to our familiar experience with ice as something shiny and bright.
- The glass cleaner and corn syrup represent the ammonia and organic molecules that are also found in comets. These compounds are essential ingredients for life on Earth and perhaps elsewhere.

If you observe the comet over several hours, you'll notice it will melt back to liquid water. If you were to put your comet in space, however, the comet's ice would turn directly from solid to gas and release wisps of water vapor on its approach to the Sun.