Carbon Dioxide Lantern

Purpose

To demonstrate combustion of magnesium in carbon dioxide.

Materials

Magnesium turnings

Dry ice (CO_2)

Propane torch

Lighter/matches

Procedure

1. Collect two large pieces of dry ice, one that can sit flat on the table and second piece that can be placed on top of the first securely.
2. Using a hammer, carve a small bowl shaped indent in the base CO_2 piece, approximately 2cm deep and 4cm in diameter.
3. Fill the depression with magnesium turnings.
4. Ignite the magnesium turnings with a propane torch and place the second block of CO_2 on top of the magnesium.
5. Step back and dim the lights.
6. Sparks and flames will accompany the reaction

Additional Information

1. If magnesium turnings are unavailable, a mixture of 2.0 grams of powder magnesium can be ignited with a 6.0 cm strip of magnesium ribbon used as a fuse.
2. A mixture of 1.0 gram of powdered aluminum and 1.0 gram of potassium chlorate can be poured around the base of the fuse to emphasize the sparks.
3. Obviously a CO_2 fire extinguisher will not put out a burning magnesium fire (class D). It must be smothered with sand.
4. The reaction is

$$2\ Mg\ (s) + CO_2\ (g) \rightarrow 2\ MgO\ (s) + C\ (s)$$

The standard heat of reaction = –809 kJ

5. The black residue is a mixture of carbon and Mg_3N (s).

Questions for the Students

1. How could you put out a Mg fire?

2. Write the chemical reaction for this reaction.

Disposal

The remaining solid from the Mg can be thrown into the trash. The CO_2 can be left to sublime.

Reference

Shakharshiri, Bassam; Chemical Demonstrations, Volume I, 1983.