

Deoxidation of carbon dioxide

Level Secondary

Concept

When an organic compound burns, carbon dioxide is produced. The property of the carbon dioxide is no combustion. It is used for the gas of extinguisher. Most materials are extinguished in the carbon dioxide gas. However, magnesium takes oxygen from carbon dioxide and burns.

Students are learning that materials don't burn in carbon dioxide. It could be surprise for students there is a material that can burn in carbon dioxide.

The concept of oxidation can be easily understood in the usual combustion. Not only oxidation but also deoxidation can be studied in this experiment.



Materials

limestone, dilute hydrochloric acid, magnesium ribbon, PET bottle, straw, clay, lighter, water, glass vessel, and deflagating spoon

Procedure

(1) The hole is made in the cap of the PET bottle.

The straw is passed through this hole.

Surroundings of the hole are shielded with clay.

(2) The limestone is crushed to the small pieces and is put in the PET bottle.

Put some dilute hydrochloric acid and carbon dioxide is produced.

(3) A little water is put in the glass vessel.

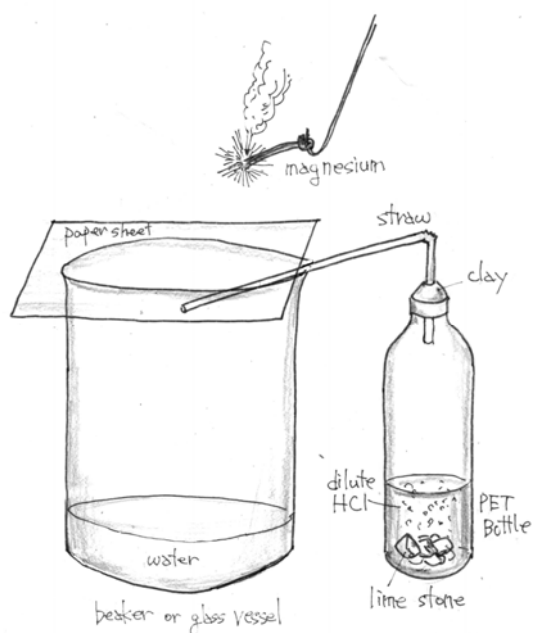
Carbon dioxide is poured in the glass vessel.

The mouth of the glass vessel is covered with paper.

(4) A small piece of magnesium ribbon is tied to the deflagating spoon.

The magnesium ribbon is ignited.

Magnesium is put in the carbon dioxide of the glass vessel.



Science

The carbon deoxidized from carbon dioxide is produced a little in this reaction.

You should carefully observe it in the water of the glass vessel. There are tiny black spots of carbon and the white ash of magnesium oxide in it.



Question

Let's consider the order of affinity for oxygen.

Oxygen combines to most materials and makes the oxide.

However, affinity for oxygen is different by the materials.

Find out the order of affinity for oxygen about iron, carbon, magnesium and sodium by the following chemical reaction.

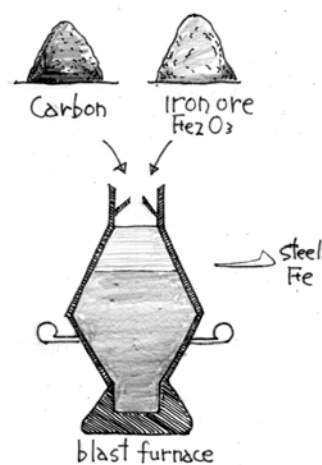
(1) The iron is made from iron ore by deoxidation.

The iron ore is mixed with carbon and heated strongly in the blast furnace at iron works.

Iron and carbon dioxide are made.

(2) Magnesium burns in carbon dioxide, and the magnesium oxide and the carbon are produced.

(3) The sodium metal reacts strongly with water and produces hydrogen. But magnesium doesn't react with water.



steel manufacturing



sodium metal reaction with water