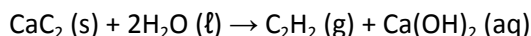


Acetylene Cannon

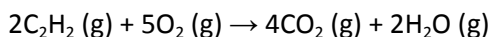
Preparer's Version

Introduction

Calcium carbide is a versatile grayish-white crystalline solid, typically produced industrially. Calcium carbide has several applications, but most commonly is used in the generation of acetylene gas. When calcium carbide reacts with water, it undergoes hydrolysis to produce acetylene gas and calcium hydroxide. The chemical equation for this reaction is:



This reaction releases a considerable amount of heat and is highly exothermic. Acetylene gas itself is highly flammable and forms explosive mixtures in air. When ignited, acetylene undergoes combustion with oxygen to produce carbon dioxide and water vapor, releasing a large amount of thermal energy. The combustion of acetylene is represented by the equation:



Safety Hazards

- Personal Protective Equipment:
 - Safety glasses/goggles
 - Nitrile gloves
 - Work gloves
 - Hearing protection
 - Chemical & flame retardant lab coat
- Physical Hazards
 - Explosive reactions can cause serious injury and/or severe burns to the skin and/or eyes.
 - Calcium carbide, when in contact with water, releases flammable gases which may ignite spontaneously; catches fire spontaneously if exposed to air.
 - Acetylene is highly flammable; under pressure may explode if heated and/or form explosive mixtures with air.

● Chemical Hazards

- Calcium carbide may cause serious respiratory irritation, eye damage, and skin irritation.
- Calcium hydroxide may cause serious respiratory irritation, eye damage, and skin irritation.
- Acetylene may cause serious respiratory damage.

Materials

- 1 UT carbide cannon
- 2g calcium carbide
- Water in squirt bottle
- BBQ lighter
- Large weigh boat
- Ring stand & ring clamp

Safety Data Sheet(s):

- [Calcium carbide](#)
- [Acetylene](#)
- [Calcium hydroxide](#)

Procedure

Someone from the Demonstrations team must be present in order for this demonstration to be performed.

1. Using a clean and dry mortar and pestle, grind up 2 g of solid calcium carbide. Be sure to wear appropriate personal protective equipment. It is safest to handle the calcium carbide in the fume hood.
2. Fill a small to medium squirt bottle with deionized water. *Keep this bottle away from your bottle of calcium carbide during transportation!*
3. Make sure the white, screw-on bottom of the cannon is clean. Check that the threads are not caked with calcium and will be able to easily and securely attach.
4. Place a foam ball into the top of the cannon, pushing it in roughly halfway.

Tips & Tricks

- Don't push the foam ball in too far – it should be loosely held in the top of the cannon so it can shoot up easily.
- This demonstration can be extremely loud, and several parties should be notified:
 - UTPD Non-emergency line. Call (512) 471-4441 and notify UTPD of a potentially loud noise for a chemistry demonstration. Make sure they know when and where the demonstration will take place, and call them when it's finished.
 - Building management. Notify any building management staff members in advance so that they can warn nearby faculty members/classrooms of a potentially loud noise.
- Keep your hearing protection on while adding water to the carbide, but keep one ear out to listen for the sound of the gas being generated. As soon as the gas generation is audible and an odor is present, secure the hearing protection over both ears before igniting the gas.

Clean-Up Procedures

1. Carefully remove the white bottom of the cannon. It is ideal to do this over a basin/bucket in case there is any splashing.
2. In a fume hood, add more water to the contents of the square well and its surroundings, ensuring that all calcium carbide has been quenched and any excess acetylene has been allowed to ventilate out.
3. Pour the liquid waste into a glass bottle and tag it for waste removal.
4. Rinse the bottom of the cannon with deionized water at least three times, emptying it into the waste bottle.
5. Thoroughly clean the white bottom of the cannon with water and laboratory soap. Allow to dry fully before using again.