

Methane Bubbles

Flammability of Gases



Introduction

This demonstration will excite and create interest in equation writing, stoichiometry, and will illuminate lighter than air gases.

Concepts

- Combustion
- Stoichiometry

Materials

Dishwashing liquid, Joy® or Dawn®, 120 mL	Matches
Glycerin, 60 mL	Meter stick
Water, distilled or deionized, 800 mL	Methane gas source
Bottle with cap, 1-L	Tape
Candle, 5" × 1¼"	Trough
Filter funnel, 75-mm	Tubing, rubber, 10–20 feet

Safety Precautions

Do not light methane bubbles larger than 4–5 inches in diameter. Only light bubbles when they are well above your head. Do not light bubbles near any heat or smoke detectors. Have someone by the gas source ready to shut off the gas supply if problems occur. Wear chemical splash goggles, chemical-resistant gloves, and a chemical-resistant apron. Please consult current Material Safety Data Sheets for additional safety, handling, and disposal information.

Preparation

To prepare bubble solution:

Mix 120 mL of Joy or Dawn dishwashing detergent, 80 mL of glycerin, and 800 mL of distilled or deionized water in a 1-L bottle. Let the mixture stand for a least 24 hours before use.

Procedure

1. Connect the funnel to the gas source with the rubber tubing. Pour the bubble solution into the trough.
2. Select a volunteer. Tape the candle to the meter stick and then light the candle.
3. Turn on the gas and adjust the flow so that when the funnel is dipped into the bubble solution, foaming does not occur.
4. Dip the funnel into the bubble solution. Hold the funnel up and allow a bubble to form.
5. Turn the funnel to one side, shake it, and allow the bubble to dislodge and float upwards.
6. When the bubble is safely above you (at least three feet), have the volunteer touch the candle flame to the bubble and observe the large flame.

Tip

Practice the flow rate before attempting this demo. If the gas flow is slightly higher than ideal, most of the bubbles will burst before they release. If the gas in the funnel inadvertently ignites, dip the funnel back into the solution to extinguish the flame and turn off the gas.

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures, and review all federal, state and local regulations that may apply, before proceeding. The soap solution may be poured back into the bottle and stored indefinitely.

Discussion

The bubbles rise because natural gas or methane, CH₄, is lighter than air. The balanced equation for the combustion of methane in air is:



Complete combustion of all hydrocarbons produces the same products: carbon dioxide and water.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12

- Systems, order, and organization
- Evidence, models, and explanation

Content Standards: Grades 9–12

- Content Standard B: Physical Science, properties and changes of properties in matter

Content Standards: Grades 9–12

- Content Standard B: Physical Science, structure and properties of matter, chemical reactions

Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *Methane Bubbles* activity, presented by Lee Marek, is available in *Flammability of Gases*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

Materials for *Methane Bubbles* are available from Flinn Scientific, Inc.

Catalog No.	Description
G0019	Glycerin
GP5050	Filter Funnel, Borosilicate Glass
AP8285	Burner Tubing

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.