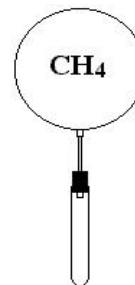


**Liquid Methane**  
**by: William C. Deese**

**Description:** Liquid methane is produced in a test tube by condensing methane gas using liquid nitrogen. As the liquid boils, vapors are ignited producing a flame at the mouth of the test tube. Frost forms on the outside of the tube.

**Materials:** 150 mm test tube with a one-hole stopper  
Plastic pipette tip to fit through hole in stopper  
Plastic inflatable beach ball  
Liquid nitrogen and small Dewar or other container  
Charcoal lighter or matches  
Test tube clamp



**Procedure:**

- 1) Expel as much air as possible from the beach ball and fill it with methane from the laboratory gas outlet.
- 2) Fit the stopper and pipette tip onto the test tube and insert the pipette tip into the valve of the beach ball.
- 3) Using the clamp, lower the test tube into liquid nitrogen. As the methane cools, it will condense into the test tube and the beach ball will slowly deflate.
- 4) Soon you will have about 10 milliliters or more of liquid and solid methane. Lift the test tube out of the nitrogen bath. Remove the stopper.
- 5) Being careful not to point the test tube at you or anyone else, light the vapors at the mouth of the tube.
- 6) Observe the flame and frosty test tube and discuss the events with your class.

**Hazards:** Use extreme caution at all times! Never allow air or oxygen to contaminate the methane in the beach ball or it may become an explosive mixture. Wear safety goggles. Protect yourself from the extreme cold of the liquid nitrogen and chilled test tube. It is possible for the liquid methane to boil over and spread the flames. Have a fire extinguisher handy. Wear fire resistant gloves.

**Disposal:** Once the liquified gases have boiled away, there is no further disposal required.

**Reference:** Robert Becker, Chem ED 95 Meeting, Norfolk, VA., August, 1995.

<u>Gas</u>	<u>B.P.</u>	<u>F.P.</u>
N <sub>2</sub>	-196 C	
O <sub>2</sub>	-183 C	
CH <sub>4</sub>	-161 C	-183 C