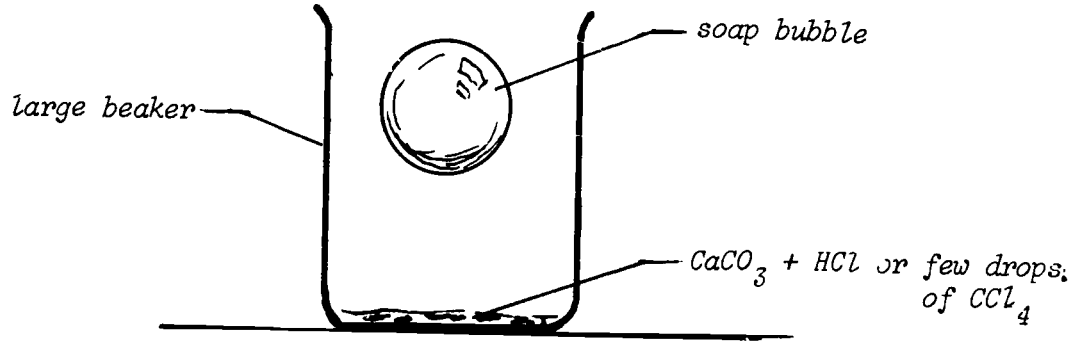
4.42. THE FLOATING SOAP BUBBLE

Materials:
1. Soap solution (1 pt JOY, 2 1/2 pts glycerine, 3 pts water).
2. A large beaker (2 litre) or clear plastic/glass container).
3. Calcium carbonate or baking soda + dilute HCl or CCl_4.
4. A large plastic straw, and a small cup.



Procedure:
1. Pour the soap solution in the cup and get ready to blow a medium size bubble with the straw.
2. Put a scoop of calcium carbonate/baking soda in the large beaker and add about 50 ml dilute hydrochloric acid or a few drops of CCl_4.
3. Blow a medium size soap bubble (smaller than the beaker's diameter) and let it calmly fall in the large beaker (either guide it into the beaker or move the beaker to catch the bubble).
4. Observe the soap bubble (this demonstration/activity should be performed in a draft-free room).

Questions:
1. What is being produced in the large beaker? (when using $CaCO_3$ and HCl?
2. Why did the soap bubble float above the liquid in the large beaker and not descend all the way to the bottom?
3. How does the density of carbondioxide or carbontetrachloride gas compare with that of atmospheric air?
4. What other gas could be used instead of carbondioxide?

Explanation:

The chemicals, calcium carbonate or baking soda plus the dilute hydrochloric acid produce carbondioxide gas in the large beaker. This gas has a larger density (in other words is heavier) than air, and therefore stays in the beaker. The concentration of this gas is most likely higher closer to the surface of the liquid or bottom of the beaker.

The density of a soap bubble is just slightly greater than that of air. This is why bubbles ever so slowly descend in the air. In the large beaker the denser carbondioxide gas acts like a cushion, and this is why the bubble is not dropping all the way to the bottom.

Instead of carbondioxide gas a few drops of carbontetrachloride can be used in the large beaker. This liquid will evaporate and the gases are also heavier than air.