Atmospheric Oxygen

Summary

Students will design a procedure to test the amount of oxygen in the air. They will also learn about careful observations and lab procedures designed to minimize error

Time Frame

1 class periods of 45 minutes each

Group Size

Small Groups

Materials

birthday candles stick of modeling clay water large beakers or cups to carry water pie tins or glass pie plates for better visibility matches or lighter 2 graduated cylinders, one needs to be large enough to cover the candle without being burned. (Short 100 mL graduates are a good size. The other grad can be any size, it is there to measure how much gas was lost.)

- student worksheet

Background for Teachers

This is a variation on a well-known but poorly understood activity. By placing a jar over a burning candle in water, the water will rise up into the jar. It is typically explained that the candle is burning the oxygen and creates a vacuum, allowing the water to enter. If students try this a number of times, they will discover that the amount of oxygen varies from trial to trial. (It is actually about 18%) The question then is, what is really happening? Careful observers will note that as the graduate is placed over the candle, the heated air inside it moves out, sometimes creating bubbles in the pan of water. This is really a better demonstration of heated gasses expanding and atmospheric pressure responding than oxygen consumption. The oxygen in the jar is being used, but only to create another gas, CO2. The vacuum is mostly due to the hot air expanding. This activity points out that often scientists learn something quite different than they set out to learn.

Another way to use this technique but avoid the expanding gases is to place steel wool in a test tube and place a balloon over the mouth of the test tube or liter pop bottle. As the steel rusts, the oxygen is consumed and pulls the balloon in. A little water in the jar increases the speed of reaction. It takes several days but is an good visual for this process.

Instructional Procedures

Step-by-step procedures are provided on the students' worksheets.

<u>NOTE about safety</u>: Students should not light the candles themselves and should be warned not to remove them from the pie plate

Bibliography

Lesson Design by Jordan School District Teachers and Staff.

Authors

Utah LessonPlans