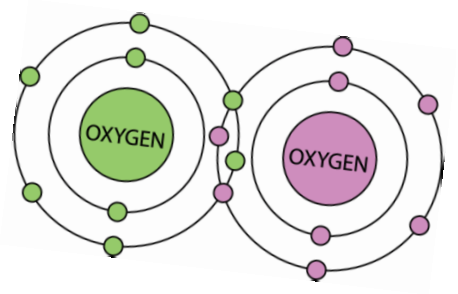
Name: _____ Period: _____ Date: _____

O_2 lab



Materials:

- 100 mL grad. cylinder
- large test tube
- small bowl
- glass-marking pencil
- small birthday candle
- matches
- clay
- water

Procedures:

1) Place a small piece of clay on the pie plate. Use it to stick the candle to the bottom of the bowl.
2) Fill test tube with water. Use graduated cylinder to measure the volume of water and record it on data table. This also represents the volume of air in the test tube.
3) Pour the water into the bowl. The clay should keep the candle upright.
4) Light the candle. Flip the test tube upside down and rapidly drop it down over the lighted candle. Make sure that the open end of the test tube is well under the surface of the water, but not touching the bottom of the bowl.
5) **As the candle uses the oxygen in the test tube, the candle will go out and water will be drawn into the tube to replace the oxygen.**
6) When the candle goes out, carefully mark the level of the water in the test tube with the glass-marking pencil. Remove the test tube.
7) Fill the test tube with water to this line and measure the volume using the graduated cylinder. Record this number on data chart.
8) To find the volume of **oxygen** originally in the test tube, subtract the volume of air after the candle goes out from the original volume. Record this volume one data chart.
9) Determine the percentage of oxygen in air by using the formula below. Record this percentage on data table.

$$\%\ \text{of oxygen} = \frac{\text{volume of oxygen in test tube}}{\text{total volume of air in test tube at start}} \times 100$$

Data Table:

Volume of air in test tube at start:	mL
Volume of air in test tube after candle goes out:	mL
Volume of oxygen:	mL
% oxygen in the air:	%
Class average:	%

Background:

Oxygen levels in the atmosphere have increased and decreased throughout geologic history, depending mostly on the presence of photosynthetic life such as plants on land and phytoplankton in the oceans. Plants take in carbon dioxide (CO_2) and release oxygen (O_2). Meanwhile, animals do the exact reverse of photosynthesis, a chemical reaction called cellular respiration, which is how the body powers itself. The continual exchange of these two gases between plants and animals is called the *carbon cycle*.

Analysis Questions:

1) Would you get the same result for the percentage of oxygen in air if a different sized test tube was used? Explain why or why not.

2) Why does the water rise in the test tube as the candle goes out?

3) Nitrogen is the other major component of air (78%). What property of nitrogen have you discovered as a result of this experiment?

4) Why is oxygen such an important part of the Earth's atmosphere?

5) Imagine that 10 million years from now, oxygen levels have spiked up to 28%. What would you guess to be the possible cause of such a drastic change to the atmosphere?

6) If oxygen levels were to *increase* in the future, what gas might you expect to *decrease* at the same time, and why? Would this be a good thing or a bad thing?