



Name: _____

Period: _____

Assigned on Friday, November 21, 2025

14.4 Lab: Dalton's Atomic Theory

Due Friday, November 21, 2025

Pre-Lab Questions

1) State the tenets of Dalton's atomic theory.

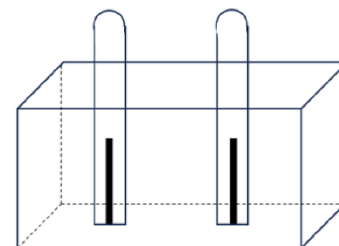
- a) _____
- b) _____
- c) _____
- d) _____
- e) _____

2) Which tenets of Dalton's atomic theory were later proven incorrect? Why?

The Experiment

Station 1: Electrolysis of Water

- 1) Measure out about 450 mL of water using a 600-mL beaker.
- 2) Stir in about 5 g of baking soda (sodium bicarbonate) into the water.
- 3) Pour the water with the baking soda into the electrolysis chamber until the electrodes are covered and also fill the two test tubes completely to the top with the baking soda water.
- 4) Placing your finger over the top of the test tubes, invert them into the electrolysis chamber so that each one is over one of the electrodes. See the diagram to the right. Do not allow air into the test tubes while you do this!
- 5) Hook up one of the wires to one of the electrodes underneath the electrolysis chamber (NOT IN THE WATER). Hook up the other wire to the other electrode underneath the electrolysis chamber.
- 6) Hook up one of the wires to the + terminal of a 9V battery and the other wire to the - terminal of the 9V battery.
- 7) What do you see occurring in the electrolysis chamber when the 9V battery is hooked up? Is the same thing happening at both electrodes? Look very carefully! Allow the reaction to run for 5 minutes. Write down your observations.



8) What do you think is happening to the water when the electricity passes through it?

9) After 5 minutes, what conclusions can be made about the ratio of hydrogen gas to oxygen gas?

10) What gas do you think is being produced at the negative electrode (the electrode hooked up to the negative terminal of the battery)? Explain your thinking for this choice.

11) Which tenet of Dalton's atomic theory is demonstrated at this station? Explain.

Station 2: Melting—What is Changing?

- 1) Get a few cubes of ice and place them in a 250-mL beaker.
- 2) Cover the top of the beaker with some aluminum foil...don't be wasteful. Use only what you need to seal the top of the beaker.
- 3) Measure and record the mass of the beaker with the ice and aluminum foil. _____
- 4) Allow the ice to melt for 10 minutes. Measure and record the mass of the beaker with the ice, water, and aluminum foil. _____
- 5) Was there any change of the mass of the beaker after melting the ice? _____
- 6) What conclusions can be drawn regarding mass and physical changes such as melting? _____

- 7) Which tenet of Dalton's atomic theory is demonstrated at this station? Explain. _____

Station 3: Ball and Stick Model Demonstration

When using molecular model sets, the different color balls represent different elements. Each ball has a specific number of holes which represent how many places that element can bond.

White = hydrogen Red = oxygen Black = carbon Blue = nitrogen Green = chlorine Orange = fluorine

- 1) How many bonds can each of the following elements make? Use the balls to determine this.

H: _____ O: _____ C: _____ N: _____ Cl: _____ F: _____

- 2) Using the balls, create models of each compound below. Each hole in the model should be filled to complete the molecule.

- | | |
|------------------------------------|--|
| a) water (hydrogen and oxygen) | d) hydrochloric acid (hydrogen and chlorine) |
| b) methane (hydrogen and carbon) | e) hydrofluoric acid (hydrogen and fluorine) |
| c) ammonia (hydrogen and nitrogen) | f) perchloromethane (carbon and chlorine) |

- 3) How many hydrogen atoms were needed to make water? _____
- 4) How many hydrogen atoms were needed to make methane? _____
- 5) How many hydrogen atoms were needed to make ammonia? _____
- 6) How many hydrogen atoms were needed to make hydrochloric acid? _____
- 7) How many hydrogen atoms were needed to make hydrofluoric acid? _____
- 8) How many chlorine atoms were needed to make perchloromethane? _____
- 9) After building the models, what are the chemical formulas for the each of the compounds you built?

- | | |
|-------------------|-----------------------------|
| a) water: _____ | d) hydrochloric acid: _____ |
| b) methane: _____ | e) hydrofluoric acid: _____ |
| c) ammonia: _____ | f) perchloromethane: _____ |

- 10) From this the models you made, what conclusions can be made about the number of atoms needed to make specific chemical compounds?

- 11) Which tenet of Dalton's atomic theory is demonstrated at this station? Explain. _____