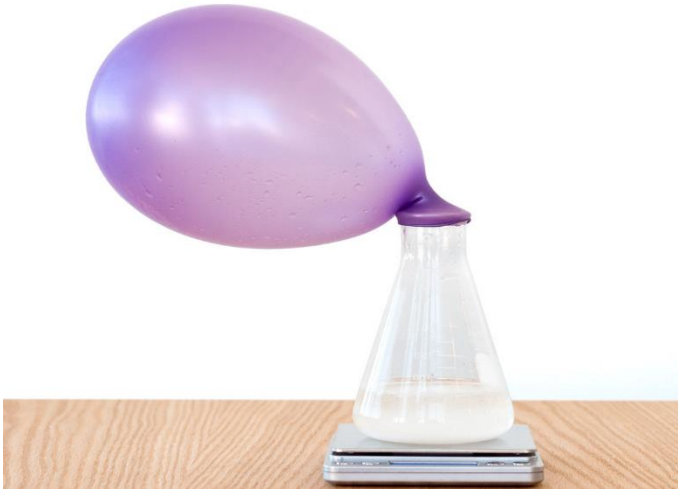
Testing the Law of Conservation of Mass

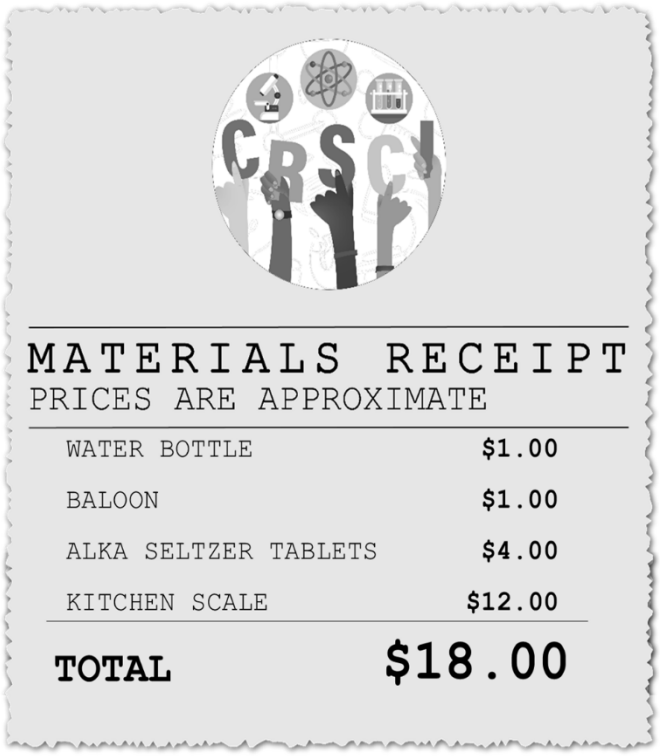
VIDEO- Lab Lesson: Chemical Reactions and Equations

INTRODUCTION:

Matter makes up everything visible in the known universe, from porta-potties to supernovas. And because matter is never created or destroyed, it cycles through our world. Atoms that were in a dinosaur millions of years ago—and in a star billions of years before that—may be inside you today.



Matter is anything that has mass and takes up space. It includes molecules, atoms, fundamental particles, and any substance that these particles make up. Matter can change form through physical and chemical changes, but through any of these changes matter is conserved. The same amount of matter exists before and after the change—none is created or destroyed. This concept is called the Law of Conservation of Mass.



Water, for example, is made up of two hydrogen atoms and one oxygen atom. Water is the only known substance on Earth that exists naturally in three states: solid, liquid, and gas. To change between these states, water must undergo physical changes. When water freezes, it becomes hard and less dense, but it is still chemically the same. There are the same number of water molecules present before and after the change, and water's chemical properties remain constant.

To form water, however, hydrogen and oxygen atoms must undergo chemical changes. For a chemical change to occur, atoms must either break bonds and/or form bonds. The addition or subtraction of atomic bonds changes the chemical properties of the substances involved. Both hydrogen and oxygen are diatomic—they exist naturally as bonded pairs (H2 and O2, respectively). In the right conditions, and with enough energy, these diatomic bonds will break and the atoms will join to form H2O (water). Chemists write out this chemical reaction as:

$$2\ H_2 + O_2 \rightarrow 2\ H_2O$$

This equation says that it takes two molecules of hydrogen and one molecule of oxygen to form two molecules of water. Notice that there are the same number of hydrogen atoms and oxygen atoms on either side of the equation.

DATA TABLE

PROCEDURE:

1. Crush 2 or 4 Alka Seltzer tablets small enough to fit into a balloon
2. Fill a water bottle halfway with water
3. Put water and seltzer filled balloon onto a kitchen scale and record mass
4. Carefully attach balloon with seltzer to water bottle and let content fall in
5. Once reaction is complete, record mass of the bottle and inflated balloon (do not detach)

Mass BEFORE REACTION (g)	Mass AFTER REACTION (g)

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Sketch the lab setup BEFORE the reaction, label the PRODUCTS and show the MASS BEFORE the reaction	Sketch the lab setup AFTER the reaction, label the PRODUCTS and show the MASS AFTER the reaction

CONCLUSION:

1. Were your values of mass BEFORE the reaction the same or different than AFTER the reaction?

2. If different, were the values of mass after the reaction HIGHER or LOWER than before?

3. Are the values significantly different?

4. Examining your data, WHY do you think you this occurred?

5. What was the purpose of the balloon during this experiment?

6. If you did not use the balloon, how would that have affected your results?

7. If you had to repeat this experiment, what would you revise or improve?