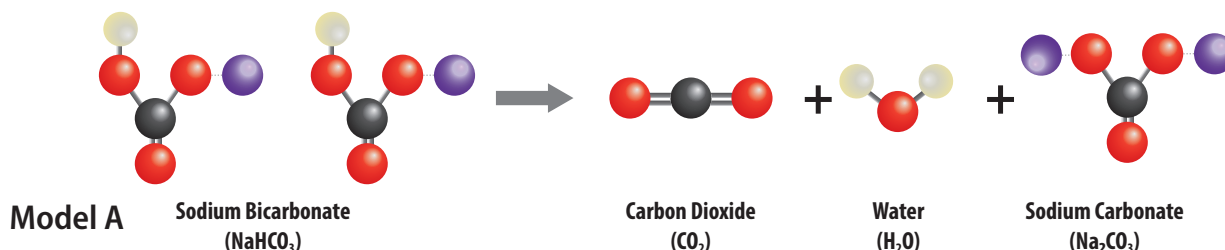


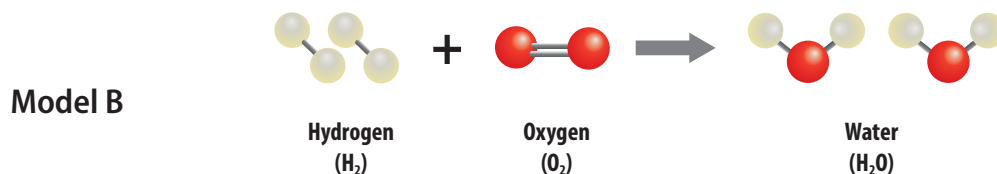
Sample Lesson #1

Chemical Reactions and Conservation of Matter

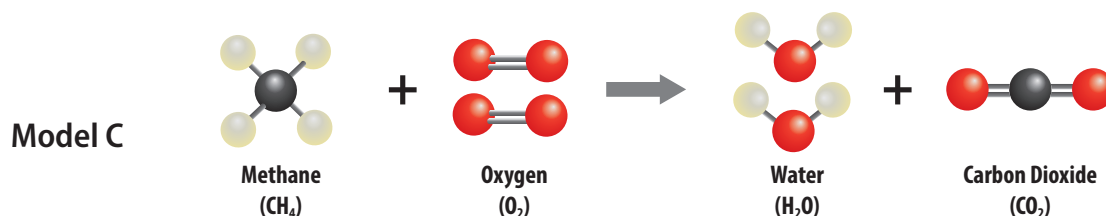
Some chemical reactions have a single reactant. For example, sodium bicarbonate (baking soda) breaks down when heated. Model A shows how baking soda breaks into three separate products: carbon dioxide, water, and sodium carbonate.



Another type of chemical reaction occurs when two or more reactants come together to form a single product. Model B shows how hydrogen and oxygen molecules rearrange and combine to form a different substance: water. The atoms are the same but, after the reaction, they are arranged differently.



Combustion (burning) is a third type of chemical reaction. For example, methane is a type of fuel. When it is burned, it reacts with oxygen to form carbon dioxide and water, as shown in Model C.



These are just a few examples of chemical reactions. Molecules break down and new molecules are constructed. But no atoms are destroyed, and no new atoms are created. These principles are demonstrated in each model. For example, the carbon atoms in the model are black. Count the carbon atoms on the reactant side of Model C. Then, count the carbon atoms on the product side. Notice that they are equal—there is one carbon atom on each side. Do the same with the hydrogen atoms (white) and then the oxygen atoms (red). Notice that the total number of each type of atom is the same in the products as it was in the reactants. Therefore, the mass (amount of matter) is the same. During a chemical reaction, matter is neither created nor destroyed. This is the **law of conservation of mass**.

1. For Model B, count the number of atoms on each side of the reaction. Complete the table. The first one has been done for you.

	Reactants	Products
hydrogen	4	
oxygen		

Explain how the model shows the law of conservation of mass.

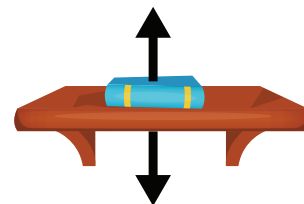
2. In a chemical reaction, the total number of atoms is conserved. This means _____.
- A) the total mass does not change
 B) no molecules are destroyed
 C) some atoms are destroyed, and some are preserved
 D) the reactants do not change in any way

3. Choose the phrases that describe a chemical reaction.

_____ a change in state, such as melting or boiling
 _____ a change in shape, size, or appearance only
 _____ atoms rearrange, forming different substances with different properties
 _____ happens through processes such as burning, decaying, or digesting
 _____ happens through processes such as chopping, grinding, or dividing

4. When a scooter hits a speed bump, what happens? Choose all that apply.

_____ The speed bump applies a force to the scooter.
 _____ There is a change in motion.
 _____ The scooter does not experience a change in motion.



5. Study the diagram. As the weight of the book pushes down on the shelf, the shelf pushes back on the book with an opposite force. This is an example of _____.

balanced forces

unbalanced forces

an action-reaction pair

If the force exerted by the book is 0.5 N, what is the force exerted by the shelf?

0.5 N

-0.5 N

-1 N

0 N