Chemical Reactions: An Introduction

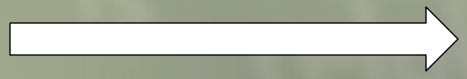
Chemical Equations- Terms to Know

Chemical Equations

- A chemical change always involves a rearrangement of atoms
- A chemical change is called a **chemical reaction**.
  - For example, when methane, CH_4, combines with oxygen, O_2, in the air and burns, carbon dioxide, CO_2, and water, H_2O, are formed.

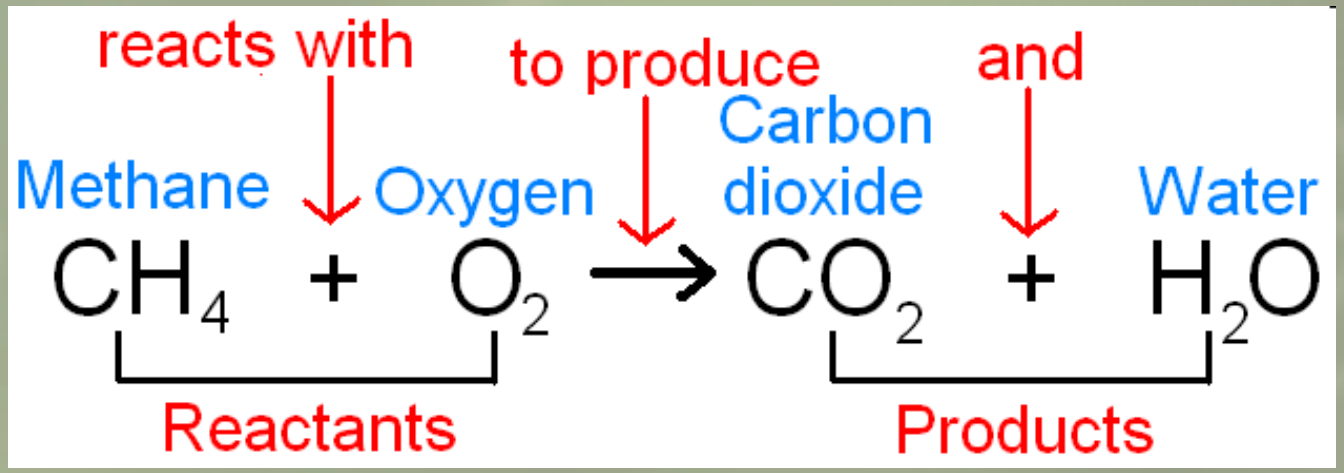
Chemical Equations

- We represent a chemical reaction by writing a **chemical equation**
- chemicals present before the reaction, the **reactants**, are shown to the left of an arrow
- chemicals formed by the reaction, the **products**, are shown to the right of an arrow.
- The arrow indicates the direction of the change and is read as "yields" or "produces."

Reactants  **Products**

Chemical Equations

– For example, when methane, CH_4, in natural gas combines with oxygen, O_2, in the air and burns, carbon dioxide, CO_2, and water, H_2O, are formed.



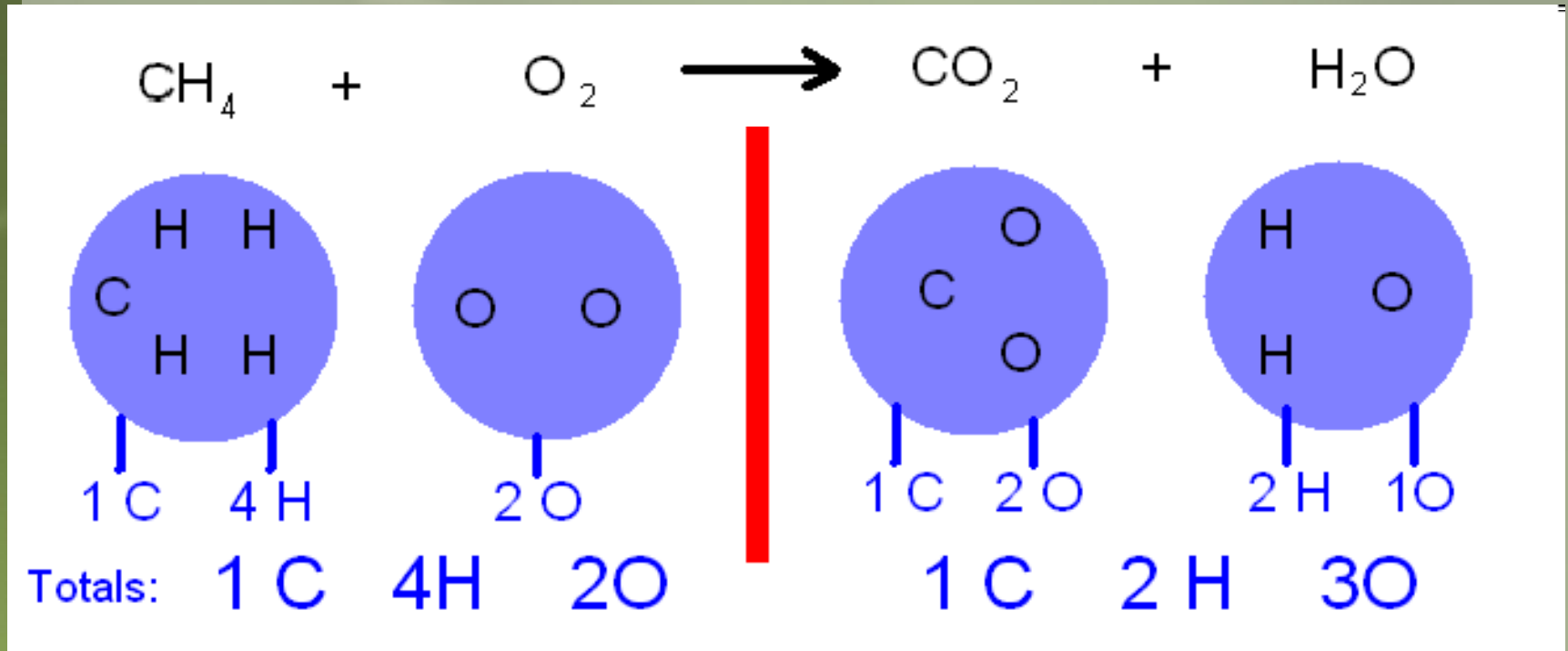
- The products from this equation have the same atoms as the reactants
- But the atoms are associated in different ways.

Chemical Equations

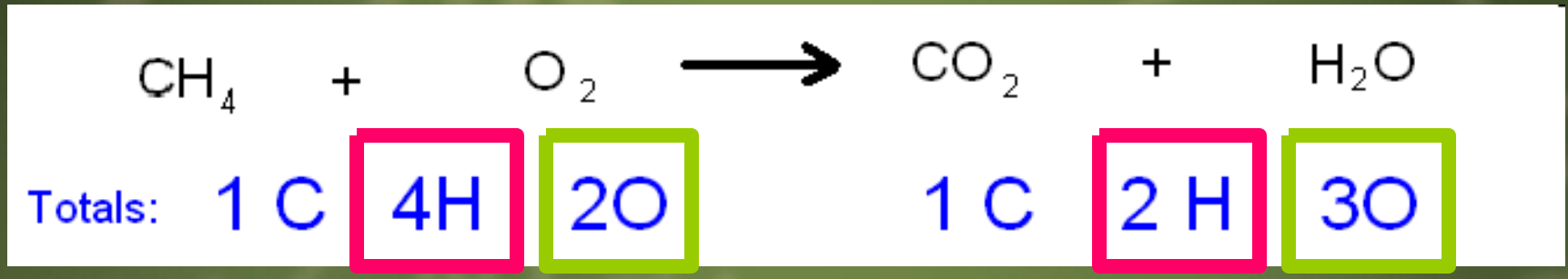
- In a chemical reaction, atoms are neither created nor destroyed.
- All atoms present in the reactants must be accounted for among the products.
  - There must be the same number of each type of atom on the product side as on the reactant side of the arrow.
- Making sure that the equation for a reaction obeys this rule is called **balancing the chemical equation** for a reaction.

Chemical Equations

- The equation for the reaction between CH_4 and O_2 is not balanced.
- We can see that it is not balanced by taking apart the reactants and products.



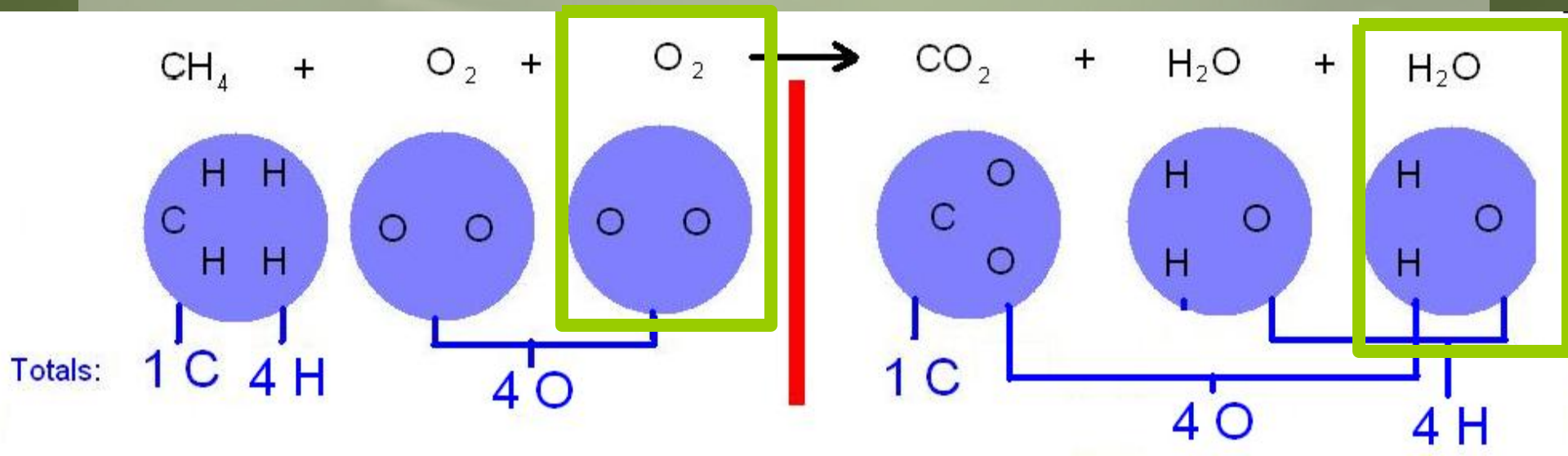
Chemical Equations



- This equation states that 1 oxygen atom is created and that 2 hydrogen atoms are destroyed.
- A reaction is only a rearrangement of the way the atoms are grouped; atoms are not created or destroyed.
- The total number of each type of atom must be the same on both sides of the arrow.

Chemical Equations

- We can fix the imbalance in this equation by involving one more O_2 molecule on the left and by showing the production of one more H_2O molecule on the right.



Chemical Equations

$CH_4 + O_2 + O_2 \rightarrow CO_2 + H_2O + H_2O$

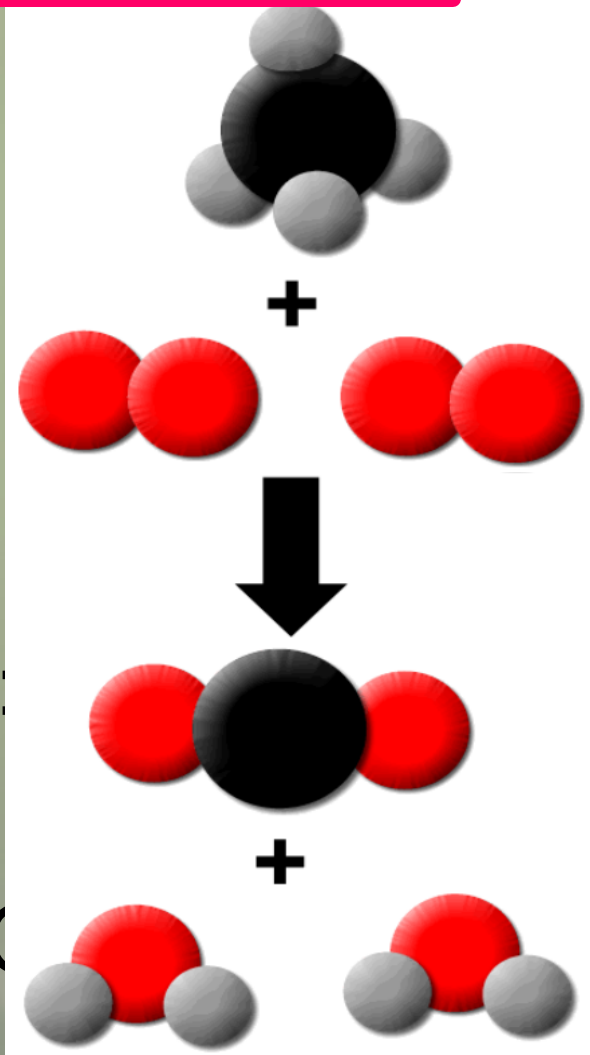
- This *balanced chemical equation* shows the actual numbers of molecules involved in this reaction.
- When we write the balanced equation for a reaction, we group like molecules together:

Coefficients- whole numbers in front of molecule (not subscripts or superscripts

coefficient

coefficient

- $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$



Chemical Equations

Let's Review

- The chemical equation for a reaction provides us with 2 important types of information:
  - The identities of the reactants and products
  - The relative numbers of each
  - Weblink review-try a quiz

The End