**Objective:** (Copy all of this into your lab notebook)

Use models to represent chemical reactions. Create physical representations of balanced chemical equations.

**Materials:** (Copy all of this into your lab notebook)

- Index cards, each labeled with an unbalanced equation
- Clay (3 different colors)
- Arrow

**Procedure:** (You do NOT need to copy this into your lab notebook)

1. You should receive three index cards, each with an unbalanced chemical equation written on them.
2. In this lab, you will use models to practice balancing chemical equations, as shown below.
3. Build models of each of the chemical reactions using colored clay. Choose a different color of clay to represent each kind of atom.

**The rules are as follows:**

a. **Reactant** – molecule models may be placed only to the left of the arrow.

b. **Product** – molecule models may be placed only to the right of the arrow.

c. You may use only *complete molecule* models (NOT individual atoms).

d. At least one of each of the **reactant** and **product molecules** shown in the equation must be included in the model when you are finish.

4. To balance your equations, **begin** by putting **one** model of each **molecule** that is a **reactant** on the **left** side of the arrow and one model of each **product** on the **right** side. (you must show that each molecule is made up of different numbers and types of atoms)

5. Add **one** reactant **molecule** or product **molecule** model at a time until the number of each of the different – colored clay atoms on each side of the arrow is the same. **REMEMBER TO FOLLOW THE RULES.**

6. When the equation is **balanced**, count the number of each of the **molecule** models you used. Write these numbers as **coefficients**. Coefficients are shown in red in the balanced equation below:

\[ 2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O} \]
**Data:** (Copy the heading into your lab notebook.)

1. Copy a table like the one below into your lab notebook. Record the requested information. Your data table will need to be bigger.

<table>
<thead>
<tr>
<th>Reactant</th>
<th>Product</th>
<th>Unbalanced Chemical Equation</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

2. Copy a table like the one below into your lab notebook. Your data table will need to be bigger.

***“Sketch of Experimental Set-Up” means draw what your clay representation looks like when you’ve finally balanced the equation.***

Your sketch should show the reactants, the products, and the yields sign. Use colors to represent the actual colors you chose for each of your elements.

<table>
<thead>
<tr>
<th>Sketch of Experimental Set-Up</th>
<th>Balanced Chemical Equation</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

**Analysis:** (Copy the heading into your lab notebook.)

Answer the question, in complete sentences, in your lab notebook.

1. The rules specify that you are allowed to use only complete molecule models, NOT individual atoms. How are these rules similar to what occurs in a real chemical reaction?
Conclusion: (Copy the heading into your lab notebook.)

Answer the question, in complete sentences, in your lab notebook.

1. Balancing chemical equations is important in chemistry because it allows chemists to calculate exactly what quantity of a reactant is needed in order to produce a desired amount of product.

   **EXAMPLE:** Fireworks involve careful placement of specific amounts of reactant compounds in order to produce the desired effect. Too much of a reactant would create disastrous results while too little of a reactant would result in the disappointment of spectators and paying customers.

   Do your best to explain how a chemist could use a balanced chemical equation to determine the amount of product the chemical reaction will produce.

Test Prep: (Copy the heading into your lab notebook.)

Answer the questions in your lab notebook, in complete sentences.

1. What is a chemical reaction?
2. What is a chemical bond?
3. How do you break chemical bonds?
4. What are chemical equations?
5. Why must chemical equations be balanced?