

## Chemical reactions Virtual Lab

**Objective: Students will be able to identify different types of reactions and observe various clues for chemical reactions by watching the demo of these reactions.**

### Background Information:

Matter can undergo physical and chemical changes. In a physical change, matter changes its appearance (physical properties) but not its composition. Examples of physical changes include changes of state (between solid, liquid, and gas phases) and making mixtures. On the other hand, in a chemical change, matter does change its composition (new substances are made). For example, the Statue of Liberty, which is covered with copper, turned green upon exposure to air because the copper reacts with gases in air to form new compounds.

### Task:

For each “station”, click on the link and use the videos below to make observations of the changes in the video in the data table below.

- **INITIAL APPEARANCE:** make sure to include color of substance and state of matter.
- **OBSERVATIONS:** what do see and hear video (during and after the change)
  - Observations include all these items: color, odor, temperature, clear or cloudy (for liquids only)
  - Observations tell if heat, light, or electricity were added during the experiment
- **FINAL APPEARANCE:** make sure to include color of substance and state of matter.
- **TYPE OF Chemical reaction:** Identify the type of chemical reaction
- **CLUE:** Clues are the observations made to indicate it is a chemical reaction.
- **Balance reaction:** Write the complete balanced reaction for this.

**Data Table: (Draw the data table on your paper or use a word document to complete. In a formula numbers must be in subscript example Water must be represented like this H<sub>2</sub>O not like this H2O. Points will be taken off) – 50 pts**

Click on the Link and write a description of the experiment in 5-6 sentences.	Initial Observation	Observation during reaction	Final Observation	Clues of chemical reaction	Type of reaction	Balanced chemical equation
1. <a href="https://youtu.be/64LMt9iUfIU">https://youtu.be/64LMt9iUfIU</a>	Strip of solid magnesium with a silvery-white color	The burning magnesium emitted a very bright light, and a white substance formed on the outer layer. The tip of the crucibles also became white.	After the magnesium was dropped onto the watch glass, it crumbled into a white powder.	Temperature change, color change, production of light. A new substance was formed (magnesium oxide).	Synthesis	$2Mg(s) + O_2(g) \rightarrow 2MgO(s)$
2. <a href="https://youtu.be/3Tn-7JcZJuQ">https://youtu.be/3Tn-7JcZJuQ</a>  Hydrogen peroxide is H <sub>2</sub> O <sub>2</sub>	Flask with 35% hydrogen peroxide and tube with regular hydrogen peroxide.	Dish soap is added to both containers and mixed. A catalyst is added to the regular	A blue and red foamy substance covers the entire surface, trapping the oxygen gas	Temperature change (exothermic), color change, oxygen gas formation.	Decomposition	$2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$

		hydrogen peroxide, causing a green foamy substance to rise and spill out, which expands and turns blue. The same reaction occurs for the 35% hydrogen peroxide, though the foam ejects from flask much quicker.	that was formed by the reaction.			
3. <a href="https://youtu.be/k8UtR7akNec">https://youtu.be/k8UtR7akNec</a>	A coil made of silver is submerged in a silver nitrate solution in a tube.	The coil is gradually breaking down and silver particles are falling to the bottom of tube.	The coil has completely broken down. Solid silver crystals are lumped at the bottom and the solution turned blue due to the copper ion.	Color change, precipitate formation.	Single replacement	$\text{Cu(s)} + 2\text{AgNO}_3\text{(aq)} \rightarrow 2\text{Ag(s)} + \text{Cu(NO}_3)_2\text{(aq)}$
4. <a href="https://youtu.be/oU9iRTYm3A8">https://youtu.be/oU9iRTYm3A8</a>	Magnesium metal (silver	Bubbles form and smoke	The magnesium	Bubble formation,	Single replacement	$\text{Mg(s)} + 2\text{HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{(g)}$

	solid) is dropped into a tube containing hydrochloric acid (colorless solution).	starts coming out of the top and condensation forms on the inside of the tube.	metal is entirely gone, leaving magnesium chloride and hydrogen gas.	heat production.		
5. <a href="https://youtu.be/qcFHPwd3HD8">https://youtu.be/qcFHPwd3HD8</a>	Silver nitrate (colorless solution) and potassium carbonate (white) are mixed in a test tube.	The solution turns milky-like and cloudy. A solid substance starts forming, settling at the bottom of the tube.	A precipitate (silver carbonate) has formed.	Color change, formation of precipitate.	Double replacement	$2AgNO_3(aq) + K_2CO_3(aq) \rightarrow Ag_2CO_3(s) + 2KNO_3(aq)$
6. <a href="https://youtu.be/HqUFmEtjeXI">https://youtu.be/HqUFmEtjeXI</a>	Video is not available.	N/A	N/A	N/A	N/A	N/A
7. <a href="https://youtu.be/NzNIZZ1fKyM">https://youtu.be/NzNIZZ1fKyM</a>	Ethanol (colorless liquid) is poured into a water jug and shaken to form ethanol vapor. A taper is used	A loud noise is produced. A flame erupts as the ethanol burns.	Liquid water is formed at the end of the reaction.	Production of sound, heat, and light.	Combustion	$C_2H_5OH(l) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l)$

	to light the vapor in the jug.					
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## **Post lab Questions ( write in complete sentences) – 10 pts**

1. Explain how you knew these were chemical reactions.

New substances were formed, indicating that a chemical reaction occurred.

2. Compare and contrast between Synthesis and Decomposition reaction (at least 2 each)

Synthesis is where two or more substances combine to form one substance, whereas decomposition is where a substance breaks down into two or more substances.

3. Compare and contrast between Single and Double replacement reaction (at least 2 each)

Single replacement is where one element in a compound is replaced by another element, while a double replacement exchanges the cations of two ionic compounds.

4. Explain how you would identify a combustion reaction from an equation.

A combustion reaction is one in which the reactants are a substance and oxygen gas and whose products are carbon dioxide gas and liquid water.

5. Compare and contrast between an endothermic and exothermic reaction.

An endothermic reaction absorbs heat from surroundings, while an exothermic reaction releases heat into its surroundings.