

# Types of Chemical Reactions POGIL

Name \_\_\_\_\_

Partners' Names \_\_\_\_\_

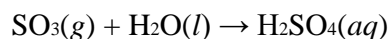
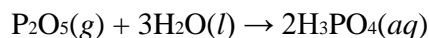
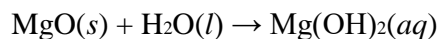
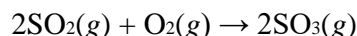
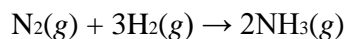
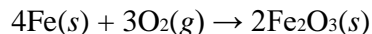
Date \_\_\_\_\_ Period \_\_\_\_\_

## Purpose

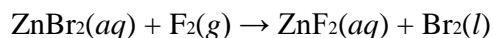
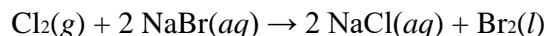
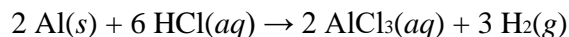
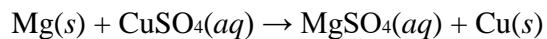
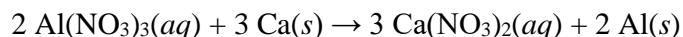
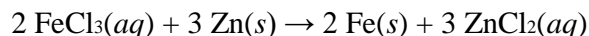
Chemists classify chemical equations according to their patterns to help predict products of unknown, but similar, chemical reactions.

## Model 1 – Types of Reactions

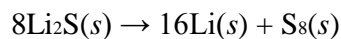
### Set A \_\_\_\_\_



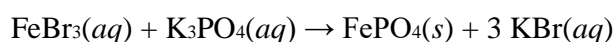
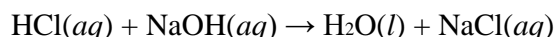
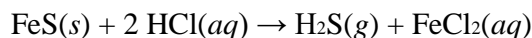
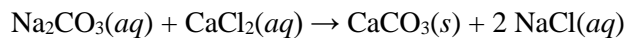
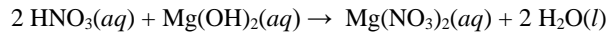
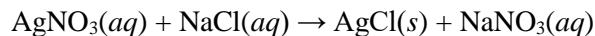
### Set C \_\_\_\_\_



### Set B \_\_\_\_\_



### Set D \_\_\_\_\_



1. The chemical equations in Model 1 contain the phase notations (*s*), (*l*), (*g*), and (*aq*). Match each symbol with its meaning.

dissolved in water/  
in solution

liquid

solid

gas

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. Match each description below to one of the reaction sets (A, B, C or D) from Model 1.

\_\_\_\_\_ Ionic compounds dissolved in water switch partners.

\_\_\_\_\_ One compound breaks into elements or smaller compounds.

\_\_\_\_\_ Two or more elements or compounds combine to form one product.

\_\_\_\_\_ Part of an ionic compound is removed and replaced by a new element.

5. Define the following terms as they are commonly used in the English language.

Synthesis \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Decomposition \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Replacement \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

6. The four sets of chemical reactions shown in Model 1 have the following general names. Discuss within your group which name belongs to which set of chemical reactions. Write the name in the appropriate place in Model 1.

Single Replacement Reaction

Synthesis Reaction

Double Replacement Reaction

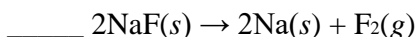
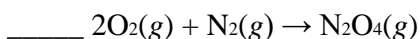
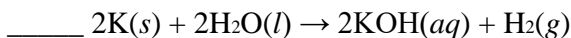
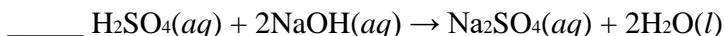
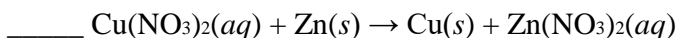
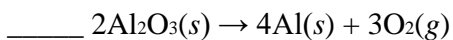
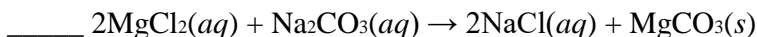
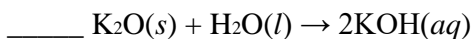
Decomposition Reaction

10. In both single replacement and double replacement reactions, which kind of element replaces which kind of element?

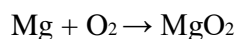
\_\_\_\_\_

or \_\_\_\_\_

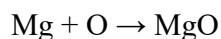
12. Identify each of the reactions below as synthesis (S), decomposition (D), single replacement (SR) or double replacement (DR).



13. A student writes the following *incorrect* chemical equation for the synthesis of magnesium oxide:



Another student writes the following *incorrect* synthesis reaction:

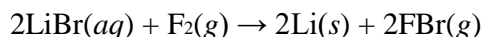


a. What is the correct formula for magnesium oxide? *Hint:* Magnesium oxide is an ionic compound.

b. What is the correct formula for oxygen as we find it in nature?

e. Write the correct balanced chemical equation for the synthesis of magnesium oxide.

14. A student writes the following *incorrect* chemical equation for a single replacement reaction between lithium bromide and fluorine.



a. In a single replacement reaction, part of an ionic compound is removed and replaced by a new element. Which element should fluorine replace in lithium bromide? *Hint:* What kind of element is fluorine? And what kind of element would that replace in a single replacement reaction?

b. What is wrong with the student's prediction of the products in the above reaction?

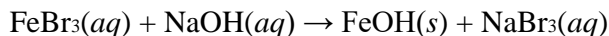
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c. Predict the products and write the correct balanced equation for the single replacement reaction between lithium bromide and fluorine. (*Hint:* The reactants side of the equation is correct in the equation the student wrote.)

15. A student writes the following incorrect chemical equation for a double replacement reaction between iron(III) bromide and sodium hydroxide solutions.



- a. What is wrong with the chemical formula(s) of the product(s) predicted by this student?

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- b. Write the correct balanced chemical equation for the double replacement reaction between iron(III) bromide and sodium hydroxide.

## Model 2 – Combustion Reactions



1. What are the products in all of the combustion reactions in Model 2?

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2. What reactant is common to all of the combustion reactions in Model 2?

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3. The “fuel” in most combustion reactions is a *hydrocarbon*. (The “fuel” is the compound that reacts with oxygen gas.) Using the examples in Model 2, write a description for the classification of substances known as hydrocarbons.

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4. Predict the products of the following combustion reactions, and balance each reaction equation.

