

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

## Types of Chemical Reactions POGIL

Do atoms rearrange in predictable patterns during chemical reactions?

### Why?

Recognizing patterns allows us to predict future behavior. Weather experts use patterns to predict dangerous storms so people can get their families to safety. Political analysts use patterns to predict election outcomes. Similarly, chemists classify chemical equations according to their patterns to help predict products of unknown but similar chemical reactions.

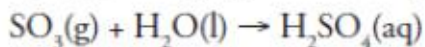
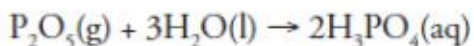
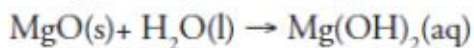
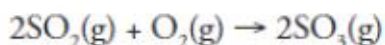
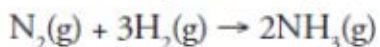
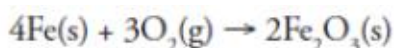
### Pre-Knowledge

1. Define the following terms from your own thoughts as they are commonly used in the English language:

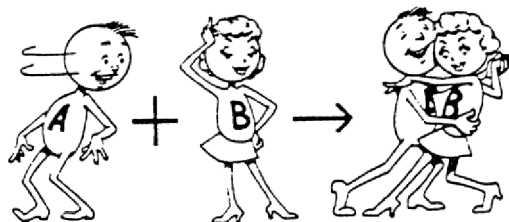
- Synthesis: \_\_\_\_\_
- Decomposition: \_\_\_\_\_
- Single Replacement: \_\_\_\_\_
- Double Replacement: \_\_\_\_\_

## Model 1: Types of Reactions

### Chemical Reactions



### Dance



### Key Questions

- Look at the chemical reactions above; describe the similarities you see.
- Using a term (vocabulary word) you defined under “pre-knowledge”, how would you classify this group of chemical reactions?

### Analogy—Dancing with Reactants

When you are thinking about the four different types of reactions, I'd like you to think about their similarity to dancing (yes, dancing).

### The Dance...

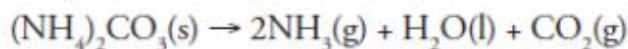
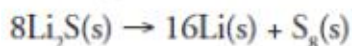
Adam and Barbara were both single. No one was talking about “Adam and Barbara” being together before the dance. They both go to the dance alone. However, they meet at just the perfect time when a song they both adore is playing. They end up holding hands the entire dance. After that fateful meeting, no one ever sees Adam without Barbara, they are forever referred to as “Aadam and Barbara.”

### Key Questions

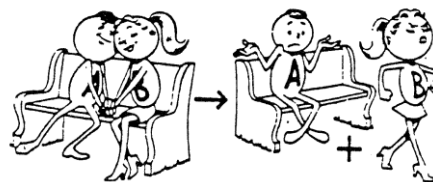
3. If A and B represent elements, describe what is happening chemically.
4. Represent the drama of Adam and Barbara as a chemical equation. Use A to represent Adam and B to represent Barbara.

## Model 2: Types of Reactions

### Chemical Reactions



### Dance



### Key Questions

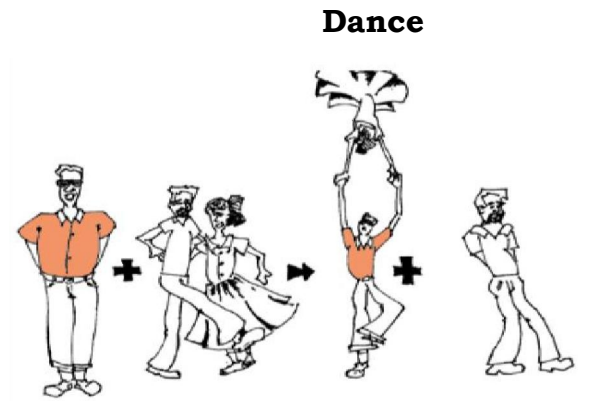
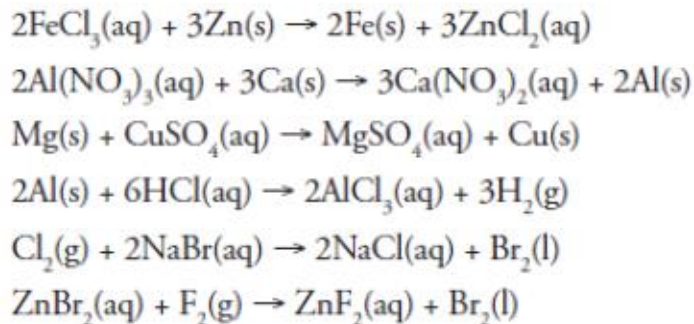
1. Look at the chemical reactions above; describe the pattern you see.
2. Using a term you defined under “pre-knowledge”, how would you classify this group of chemical reactions?

### The Dance Continues...

Later that same evening, Aadam and Barbara, who have been “the couple” forever, have a *heated* quarrel and break up.

3. If A and B represent elements, describe what is happening chemically.
4. Represent the drama of Aadam and Barbara as a chemical equation. Use A to represent Adam and B to represent Barbara.

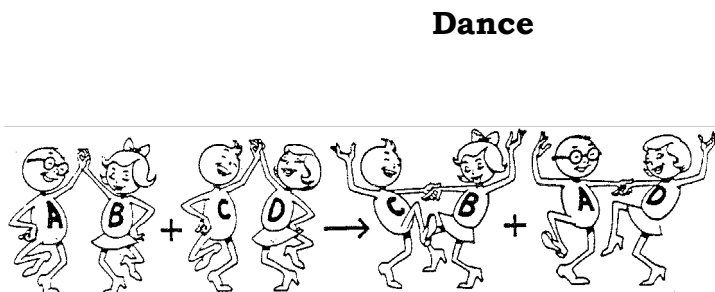
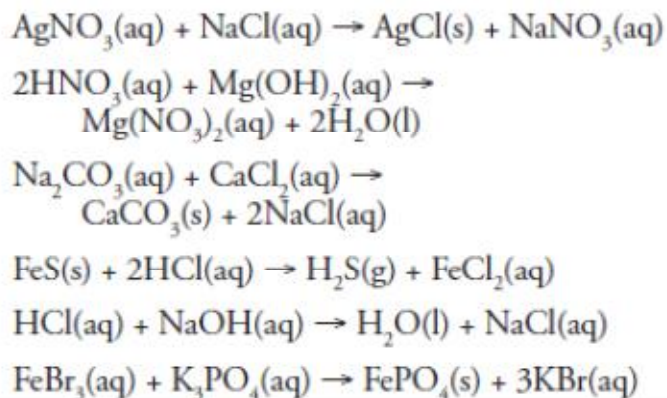
### Model 3: Types of Reactions Chemical Reactions



#### Key Questions

1. Look at the chemical reactions above; describe the pattern you see.
2. Using a term you defined under pre-knowledge, how would you classify this group of chemical reactions?
3. Write a chemical reaction for this scenario using A, B, and C.

### Model 4: Types of Reactions Chemical Reactions



#### Key Questions

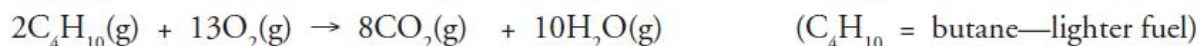
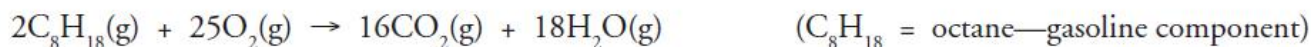
1. Look at the chemical reactions above; describe the pattern you see.
2. Using a term you defined under “pre-knowledge”, how would you classify this group of chemical reactions?
3. What phase are most of the reactants? \_\_\_\_\_
4. Are all the products this phase as well? \_\_\_\_\_

### The Dance Continues...

In their blissful state, Adam and Barbara (AB) try to help Carter and Diana (CD) reconcile their differences. After everyone agrees to stop quarreling, Adam asks Diana to dance. Carter and Barbara decided that they will dance together, too.

1. Represent Adam and Barbara's attempt to reconcile Carter and Diana's differences as a chemical equation. Write a chemical reaction for this scenario using A, B, C, and D.

### Model 5: Combustion Reactions



1. What are the two general products in all of the combustion reactions in Model 5?
2. What reactant is common in all of the combustion reactions in Model 5?

### Individual Assessment

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

Reaction	Type	Reaction	Type
$\text{Mg} + \text{FeCl}_2 \rightarrow \text{MgCl}_2 + \text{Fe}$		$\text{F}_2 + 2 \text{KBr} \rightarrow \text{Br}_2 + 2 \text{KF}$	
$\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 6 \text{C} + 6 \text{H}_2\text{O}$		$2 \text{K} + \text{CaO} \rightarrow \text{Ca} + \text{K}_2\text{O}$	
$2 \text{NaNO}_3 + \text{NiSO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{Ni}(\text{NO}_3)_2$		$\text{CH}_4 + 2 \text{O}_2 \rightarrow \text{CO}_2 + 2 \text{H}_2\text{O}$	
$2 \text{Ni} + \text{O}_2 \rightarrow 2 \text{NiO}$		$4 \text{Mn} + 7 \text{O}_2 \rightarrow 2 \text{Mn}_2\text{O}_7$	