

## Classifying Reactions Worksheet Answer Key PDF

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### Part 1: Building a Foundation

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**Which of the following is a synthesis reaction?**

undefined.  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$  ✓

undefined.  $2\text{HgO} \rightarrow 2\text{Hg} + \text{O}_2$

undefined.  $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$

undefined.  $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$

A synthesis reaction involves combining two or more substances to form a new compound.

**Which of the following are characteristics of a decomposition reaction?**

undefined. Involves a single reactant ✓

undefined. Produces simpler substances ✓

undefined. Requires a catalyst ✓

undefined. Releases energy

Decomposition reactions typically involve a single reactant breaking down into simpler products.

**Explain the Law of Conservation of Mass and its importance in balancing chemical equations.**

**The Law of Conservation of Mass states that mass is neither created nor destroyed in a chemical reaction, which is crucial for balancing equations.**

**List the general equations for the following reaction types:**

1. Single Replacement



2. Double Replacement

## AB + CD → AD + CB

The general equations for single and double replacement reactions are essential for understanding these types.

### What is the product of a combustion reaction involving a hydrocarbon?

undefined. Water and Carbon Dioxide ✓

undefined. Oxygen and Hydrogen

undefined. Carbon Monoxide and Water

undefined. Nitrogen and Oxygen

Combustions of hydrocarbons typically produce carbon dioxide and water.

## Part 2: Understanding and Interpretation

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### In a single replacement reaction, which of the following will occur?

undefined. Two elements will combine to form a compound.

undefined. An element will replace another element in a compound. ✓

undefined. A compound will break down into two elements.

undefined. Two compounds will exchange ions.

In a single replacement reaction, one element replaces another in a compound.

### Which of the following factors can affect the rate of a chemical reaction?

undefined. Temperature ✓

undefined. Concentration of reactants ✓

undefined. Surface area of reactants ✓

undefined. Presence of a catalyst ✓

Factors such as temperature, concentration, surface area, and catalysts can significantly influence reaction rates.

### Describe how you would identify a double replacement reaction in a chemical equation.

A double replacement reaction can be identified by the exchange of ions between two compounds.

### Part 3: Application and Analysis

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Given the reaction:  $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$ , which of the following statements are true?

undefined. This is a synthesis reaction. ✓

undefined. Sodium is oxidized.

undefined. Chlorine is reduced.

undefined. This is a decomposition reaction.

This reaction is a synthesis reaction where sodium reacts with chlorine to form sodium chloride.

Predict the products of the reaction between calcium carbonate ( $\text{CaCO}_3$ ) and hydrochloric acid ( $\text{HCl}$ ), and write the balanced chemical equation.

The reaction produces calcium chloride, water, and carbon dioxide, and the balanced equation is  $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$ .

Which type of reaction is occurring when hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) decomposes into water and oxygen?

undefined. Synthesis

undefined. Decomposition ✓

undefined. Single Replacement

undefined. Combustions

The decomposition of hydrogen peroxide is a classic example of a decomposition reaction.

Analyze the following reaction and determine whether it is balanced:  $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$

The equation is balanced as the number of atoms for each element is the same on both sides.

In the reaction  $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$ , which of the following analyses are correct?

undefined. Potassium chlorate is decomposing. ✓

undefined. Oxygen is being produced. ✓

undefined. The reaction is balanced. ✓

undefined. This is a synthesis reaction.

This reaction is a decomposition reaction where potassium chlorate breaks down into potassium chloride and oxygen.

## Part 4: Evaluation and Creation

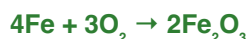
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**Evaluate the environmental impact of combustion reactions and propose alternative energy sources that could reduce these impacts.**

**Combustions release pollutants and greenhouse gases, and alternative energy sources like solar and wind can mitigate these impacts.**

**Create balanced chemical equations for the following scenarios:**

1. Iron reacts with oxygen to form iron(III) oxide.



2.  $\text{BaCl}_2$  reacts with  $\text{H}_2\text{SO}_4$  to form  $\text{BaSO}_4$  and  $\text{HCl}$ .



Balanced equations reflect the conservation of mass and are essential for understanding chemical reactions.

**Which of the following is a sustainable practice to minimize the negative effects of chemical reactions in industry?**

undefined. Increasing the use of fossil fuels

**undefined. Implementating green chemistry principles ✓**

undefined. Maximizing waste production

undefined. Ignoring reaction by-products

Implementating green chemistry principles is a sustainable practice that minimizes waste and reduces harmful effects.