

# Activity # 15

Name \_\_\_\_\_

Date \_\_\_\_\_

Date due \_\_\_\_\_

## Assignment on Types of Reactions

**NOTE:** This assignment is based on material given in your notes as well as pages 220 - 226 in the Science Probe textbook.

- What is meant by an **exothermic** reaction? \_\_\_\_\_  
\_\_\_\_\_
- What is meant by an **endothermic** reaction? \_\_\_\_\_  
\_\_\_\_\_
- During an exothermic reaction, the surroundings (including the reaction vessel) will get (*warmer/cooler*) \_\_\_\_\_
- During a **spontaneous endothermic** reaction, the surroundings (including the reaction vessel) will get (*warmer/cooler*) \_\_\_\_\_
- Label each of the following reactions as **exothermic** or **endothermic**:
  - $\text{MgCO}_3 + \text{energy} \rightarrow \text{MgO} + \text{CO}_2$  ..... \_\_\_\_\_
  - $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O} + \text{heat}$  ..... \_\_\_\_\_
  - $\text{H}_2\text{O}_{(s)} \rightarrow \text{H}_2\text{O}_{(l)}$  ..... \_\_\_\_\_
  - $\text{H}_2\text{O}_{(l)} \rightarrow \text{H}_2\text{O}_{(g)}$  ..... \_\_\_\_\_
  - $\text{H}_2\text{O}_{(g)} \rightarrow \text{H}_2\text{O}_{(l)}$  ..... \_\_\_\_\_
  - $\text{CO}_{2(s)} \rightarrow \text{CO}_{2(g)}$  ..... \_\_\_\_\_

6. During a **synthesis** reaction, elements form a \_\_\_\_\_  
or substances with smaller formulas combine to form a compound with a  
\_\_\_\_\_ formula.
7. Give an example of a synthesis reaction in which two elements combine to form a compound.  
Make sure the equation is balanced.  
\_\_\_\_\_
8. Give an example of a synthesis reaction in which an element and a compound combine to form  
another compound with a larger formula. Make sure the equation is balanced.  
\_\_\_\_\_
9. During a **decomposition** reaction, a \_\_\_\_\_ breaks down into it's  
\_\_\_\_\_, or a compound with a larger formula breaks  
down into substances with \_\_\_\_\_ formulas.
10. Give an example of a decomposition reaction in which a compound breaks down into it's  
elements. Make sure the equation is balanced.  
\_\_\_\_\_
11. Give an example of a decomposition reaction in which a compound with a larger formula  
breaks down into substances with smaller formulas. Make sure the equation is balanced.  
\_\_\_\_\_
12. During a **single replacement** reaction, an \_\_\_\_\_ and a  
compound rearrange to form a different element and a different \_\_\_\_\_.  
The single \_\_\_\_\_ replaces the combined element in the compound.
13. Give an example of a single replacement reaction where a single metal replaces a combined  
metal in a compound.  
\_\_\_\_\_
14. In a **double replacement** reaction, the ions in two compounds \_\_\_\_\_  
places.

15. Give an example of a double replacement reaction.

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16. A **neutralization** reaction is a type of double replacement reaction in which a

an \_\_\_\_\_ + a \_\_\_\_\_  $\rightarrow$  \_\_\_\_\_ + a \_\_\_\_\_

17. Most acids (except CH<sub>3</sub>COOH) start with the letter \_\_\_\_\_ and most bases end with

the letters \_\_\_\_\_.

18. Give an example of a neutralization reaction.

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19. Classify each of the following reactions as synthesis (SYN), decomposition (DEC), single replacement(SR), double replacement(DR) or neutralization(N).

Reaction	Type
$2\text{KNO}_3 \rightarrow 2\text{KNO}_2 + \text{O}_2$	
$2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$	
$\text{Pb}(\text{NO}_3)_2 + \text{K}_2\text{CrO}_4 \rightarrow \text{PbCrO}_4 + 2\text{KNO}_3$	
$\text{Cu} + 2\text{AgNO}_3 \rightarrow 2\text{Ag} + \text{Cu}(\text{NO}_3)_2$	
$2\text{Fe} + 6\text{HCl} \rightarrow 2\text{FeCl}_3 + 3\text{H}_2$	
$3\text{Ca}(\text{OH})_2 + 2\text{H}_3\text{PO}_4 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + 6\text{H}_2\text{O}$	
$2\text{NaCl} + 3\text{O}_2 \rightarrow 2\text{NaClO}_3$	
$\text{Fe} + \text{CuSO}_4 \rightarrow \text{Cu} + \text{FeSO}_4$	
$\text{BeO} + \text{CO}_2 \rightarrow \text{BeCO}_3$	
$\text{Al}_2(\text{SO}_4)_3 + \text{Ca}_3(\text{PO}_4)_2 \rightarrow 2\text{AlPO}_4 + 3\text{CaSO}_4$	
$2\text{Ag}_2\text{O} \rightarrow 4\text{Ag} + \text{O}_2$	
$\text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$	
$\text{Al}(\text{OH})_3 + 3\text{HC}_2\text{H}_3\text{O}_2 \rightarrow \text{Al}(\text{C}_2\text{H}_3\text{O}_2)_3 + 3\text{H}_2\text{O}$	
$\text{Br}_2 + 2\text{KI} \rightarrow 2\text{KBr} + \text{I}_2$	
$\text{AgNO}_3 + \text{KCl} \rightarrow \text{AgCl} + \text{KNO}_3$	
$2\text{Al} + 3\text{Pb}(\text{NO}_3)_2 \rightarrow 3\text{Pb} + 2\text{Al}(\text{NO}_3)_3$	
$\text{Cd}_3(\text{PO}_4)_2 + 3(\text{NH}_4)_2\text{S} \rightarrow 3\text{CdS} + 2(\text{NH}_4)_3\text{PO}_4$	
$2\text{KOH} + \text{H}_2\text{SO}_4 \rightarrow \text{K}_2\text{SO}_4 + 2\text{H}_2\text{O}$	
$2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$	

20. **Balance** and **classify** each of the following reactions as synthesis (SYN), decomposition (DEC), single replacement (SR), double replacement (DR) or neutralization (N).

Reaction	Type
$\text{FeS} + \text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2\text{S}$	
$\text{Ba}(\text{ClO}_3)_2 \rightarrow \text{BaCl}_2 + \text{O}_2$	
$\text{KCl} + \text{O}_2 \rightarrow \text{KClO}_3$	
$\text{Zn} + \text{HBr} \rightarrow \text{ZnBr}_2 + \text{H}_2$	
$\text{Ag}_2\text{O} \rightarrow \text{Ag} + \text{O}_2$	
$\text{NaCl} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{HCl}$	
$\text{Al} + \text{CuCl}_2 \rightarrow \text{Cu} + \text{AlCl}_3$	
$\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{NaOH}$	
$\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}_2$	
$\text{Al}(\text{OH})_3 \rightarrow \text{Al}_2\text{O}_3 + \text{H}_2\text{O}$	
$\text{CaCO}_3 + \text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{CO}_3$	
$\text{Fe} + \text{HCl} \rightarrow \text{FeCl}_3 + \text{H}_2$	
$\text{N}_2\text{O}_5 + \text{H}_2\text{O} \rightarrow \text{HNO}_3$	
$\text{Be} + \text{HCl} \rightarrow \text{BeCl}_2 + \text{H}_2$	
$\text{Pb}(\text{NO}_3)_2 + \text{K}_2\text{S} \rightarrow \text{PbS} + \text{KNO}_3$	
$\text{Al}(\text{OH})_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + \text{H}_2\text{O}$	
$\text{Fe} + \text{AgCH}_3\text{COO} \rightarrow \text{Ag} + \text{Fe}(\text{CH}_3\text{COO})_2$	
$\text{AgCH}_3\text{COO} + \text{K}_2\text{CrO}_4 \rightarrow \text{Ag}_2\text{CrO}_4 + \text{KCH}_3\text{COO}$	

21. A reaction is carried out in which a clear aqueous solution of lead (II) nitrate is mixed with a pale yellow solution of potassium iodide. A thick yellow precipitate forms in the test tube.

- a) Write the names of the two reactants \_\_\_\_\_  
 & \_\_\_\_\_
- b) Write the formulas for the two reactants \_\_\_\_\_ & \_\_\_\_\_

- c) Write the names of the two products in this reaction: \_\_\_\_\_  
and \_\_\_\_\_.
- d) Write the correct formulas for the two products in this reaction: \_\_\_\_\_  
and \_\_\_\_\_.
- e) Write a balanced chemical equation for this reaction:  
\_\_\_\_\_
- f) What type of reaction is this? \_\_\_\_\_
22. A reaction is carried out in which a clear aqueous solution of silver nitrate is mixed with a yellow solution of potassium chromate. A thick red precipitate forms in the test tube.
- a) Write the names of the two reactants \_\_\_\_\_  
& \_\_\_\_\_
- b) Write the formulas for the two reactants \_\_\_\_\_ & \_\_\_\_\_
- c) Write the names of the two products in this reaction: \_\_\_\_\_  
and \_\_\_\_\_.
- d) Write the correct formulas for the two products in this reaction: \_\_\_\_\_  
and \_\_\_\_\_.
- e) Write a balanced chemical equation for this reaction:  
\_\_\_\_\_
- f) What type of reaction is this? \_\_\_\_\_
23. A piece of solid copper wire is placed in a solution of silver nitrate. After a while, crystals of silver begin to form on the surface of the copper wire.
- a) Silver is one of the **products**. The other product is a compound in which copper has an ion charge of 2+. What is the name of this compound? \_\_\_\_\_  
What is the formula for this compound? \_\_\_\_\_

- b) The names of the two reactants in this reaction are \_\_\_\_\_  
and \_\_\_\_\_.
- c) The chemical formulas for the two reactants are \_\_\_\_\_ and \_\_\_\_\_
- d) The names of the two products in this reaction are \_\_\_\_\_  
and \_\_\_\_\_.
- e) The chemical formulas for the two products are \_\_\_\_\_ and \_\_\_\_\_
- f) Write a balanced chemical equation for this reaction:  
\_\_\_\_\_
- g) What type of reaction is this? \_\_\_\_\_
24. A solution of  $\text{H}_3\text{PO}_4$  is mixed with a solution of  $\text{NaOH}$  and a chemical reaction occurs.
- a)  $\text{H}_3\text{PO}_4$  is what type of compound? (four letters) an \_ \_ \_ \_.
- b)  $\text{NaOH}$  is what type of compound? (four letters) a \_ \_ \_ \_
- c) Write the **names** of the two products in this reaction: \_\_\_\_\_  
& \_\_\_\_\_.
- d) Write the chemical formulas for the two products of this reaction: \_\_\_\_\_ & \_\_\_\_\_
- e) Write a balanced chemical equation for this reaction:  
\_\_\_\_\_
- f) What type of reaction is this: double replacement or \_\_\_\_\_.
25. When a single compound breaks up into two elements, this type of reaction is called  
\_\_\_\_\_.
26. When two elements combine to form a single compound, this type of reaction is called  
\_\_\_\_\_.
27. When an acid and a base react with each other, this type of reaction is called  
\_\_\_\_\_.