**Chemistry**

**YOUR CHOICES + YOUR ACTIONS = YOUR FUTURE!!!**

**Packet# 6**

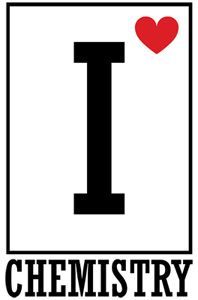
**Chemical Reactions**

(BRING THIS WITH YOU TO EVERY CLASS)

*“Success is not the result of spontaneous combustion. You must set yourself on fire.”*

Class Website: http://mrgchem.weebly.com

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*Note: You are expected to work on this packet during the allotted class practice time.*

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| --- | --- | --- | --- | --- |
| **Packet** | | **Followed All Classroom Policies** | | **Class work Participation** |
| /35 | Completed Class Notes | /20 | Monday | /20 |
| /35 | Completed Classwork | /20 | Tuesday | /20 |
| /5 | Writing Name on Every Page | /20 | Wednesday | /20 |
| /25 | Handed Packet in on Time | /20 | Thursday | /20 |
| /100 | Total Points | /20 | Friday | /20 |
|  |  | / | Total Points | / |

Name of Chemist:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Period: \_\_\_\_\_\_\_\_\_\_\_

*\*All Classnotes + Questions MUST be finished for HOMEWORK if not done in class (whether we got through it all or not).\**

***DUE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Objective: SWBAT describe the indications of a chemical reaction.**  **SWBAT define the symbols used in a chemical equation.** |
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Class Notes:

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| **Chemical Reactions**  **(Textbook Pages 261 – 266)**  A chemical reaction is the process by which one or more substances are changed into one or more *different* substances.  **Reactants:**  **Products:**  How do we know a chemical reaction occurred?  1.  2.  3.  4.  Vocabulary:  Precipitate: A solid that is produced as a result of a chemical reaction in solution and that separates from the solution.  Catalyst: A substance that changes the rate of a chemical reaction, but can be recovered unchanged.  **Chemical Equation:**  A chemical reaction must have the following characteristics:   1. Represent **all substances** involved in the chemical reaction. 2. Contain the **correct chemical formulas** for the reactants and products in the chemical reaction. 3. The law of **conservation of mass** must be satisfied. (The Law of Conservation of Mass says that atoms can neither be created nor destroyed.)   \*The symbols for a chemical reaction are shown on the next page. |

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Objective: SWBAT describe the indications of a chemical reaction.**  **SWBAT define the symbols used in a chemical equation.** |

Class Work:

1. Jessica foolishly mixed two unknown substances together in a flask. Describe how you can tell if a chemical reaction occurred in the flask.
2. Look at the chemical equation below. Label the equation using the following terms: products, reactants, yields, gas state.

CH4(g) + 2O2 🡪 CO2(g) + 2H2O(g)

1. What does the little triangle above the arrow in a chemical reaction signify?
2. Fill in the following chart using your notes as a guide.

|  |  |
| --- | --- |
| ***Symbol*** | ***Meaning*** |
|  |  |
|  | Reactants are heated |
|  | Palladium catalyst used to change the rate of reaction |
| (s) |  |
| (aq) |  |
|  |  |
|  | A reaction is reversible |

1. PdCl2(PPh3)2 is a useful catalyst in a reaction. Describe *where* the chemical formula of PdCl2(PPh3)2 should be written in a chemical reaction.

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Objectives: SWBAT determine whether a chemical equation is balanced.** |

**Balancing Chemical Equations**

**(Textbook Pages 270 – 274)**

The Law of the Conservation of Mass states \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

How to Balance a Chemical Equation:

1. Count the number of atoms of each element you have in each molecule on both sides of the arrow.
2. If the numbers of atoms of each element are not equal on both sides of the arrow, you must balance the equation by **adding a number in front of the chemical formula**. (This number in front is called the **coefficient**.)
3. Multiply the coefficient by the subscripts of each element to get the number of atoms.
4. If the numbers of atoms are still not equal, try a different coefficient. Balancing equations requires a lot of trial and error.

Example:

This chemical equation is not balanced:

Zn(s) + HCl (aq) 🡪 ZnCl2(aq) + H2(g)

|  |  |
| --- | --- |
| ***Left Side of Arrow*** | ***Right Side of Arrow*** |
| Zn = 1 | Zn = 1 |
| H = 1 | H = 2 |
| Cl = 1 | Cl = 2 |

The coefficient “2” was added in front of HCl

Zn(s) + **2**HCl (aq) 🡪 ZnCl2(aq) + H2(g)

|  |  |
| --- | --- |
| ***Left Side of Arrow*** | ***Right Side of Arrow*** |
| Zn = 1 | Zn = 1 |
| H = 2 | H = 2 |
| Cl = 2 | Cl = 2 |

The numbers of atoms of each element are equal on both sides of the arrow. This chemical equation is now **balanced.**

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Objective: SWBAT determine whether a chemical equation is balanced.** |

Class Work:

1. What is the number in front of a chemical formula called?
2. Determine the number of atoms of each element below.

The first one has been done for you as an example.

* + 1. 2C6H2
       - 1. C: \_\_\_12\_\_\_
         2. H: \_\_\_\_4\_\_
    2. 4CO2
       - 1. C: \_\_\_\_\_\_
         2. O: \_\_\_\_\_\_
    3. MgCl2
       - 1. Mg: \_\_\_\_\_\_
         2. Cl: \_\_\_\_\_\_
    4. Ca3(PO4)2
       - 1. Ca: \_\_\_\_\_\_
         2. P: \_\_\_\_\_\_
         3. O: \_\_\_\_\_\_
    5. 5NaCl
       - 1. Na: \_\_\_\_\_\_
         2. Cl: \_\_\_\_\_\_
    6. 25H2
       - 1. H: \_\_\_\_\_\_
    7. 12Na2O
       - 1. Na: \_\_\_\_\_\_
         2. O: \_\_\_\_\_\_
    8. N2 + **3** H2 🡪 **2** NH3

|  |  |  |
| --- | --- | --- |
|  | Left | Right |
| N |  |  |
| H |  |  |

Is it balanced?

* + 1. KClO3 🡪 KCl + O2

|  |  |  |
| --- | --- | --- |
|  | Left | Right |
| K |  |  |
| Cl |  |  |
| O |  |  |

Is it balanced?

* + 1. **2** NaCl + F2 🡪 **2** NaF + Cl2

|  |  |  |
| --- | --- | --- |
|  | Left | Right |
| Na |  |  |
| Cl |  |  |
|  |  |  |

* + 1. H2 + O2 🡪 H2O

|  |  |  |
| --- | --- | --- |
|  | Left | Right |
| H |  |  |
| O |  |  |

Is it balanced?

* + 1. Pb(OH)2 + **2** HCl 🡪 **2** H2O + PbCl2

|  |  |  |
| --- | --- | --- |
|  | Left | Right |
| Pb |  |  |
| O |  |  |
| H |  |  |
| Cl |  |  |

Is it balanced?

|  |  |  |
| --- | --- | --- |
| F |  |  |

Is it balanced?

|  |
| --- |
| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Objective: SWBAT balance a chemical equation.** |

Class Work:

Balance the following equations by placing the correct coefficient in front each chemical formula:

1. \_\_\_\_\_Na(s) + \_\_\_\_\_Cl2 (g) 🡪 \_\_\_\_NaCl
2. \_\_\_\_\_Cu(s) + \_\_\_\_\_AgNO3(aq) 🡪 \_\_\_\_\_\_\_Cu(NO3)2(aq) + \_\_\_\_\_Ag(s)
3. \_\_\_\_\_Fe2O3(s) + \_\_\_\_\_\_3CO(g) 🡪 \_\_\_\_\_\_\_Fe(s) + \_\_\_\_\_\_\_CO2(g)
4. \_\_\_\_ N2 + \_\_\_\_ H2 🡪 \_\_\_\_ NH3
5. \_\_\_\_ KClO3 🡪 \_\_\_\_ KCl + \_\_\_\_ O2
6. \_\_\_\_ NaCl + \_\_\_\_ F2 🡪 \_\_\_\_ NaF + \_\_\_\_ Cl2
7. \_\_\_\_ H2 + \_\_\_\_ O2 🡪 \_\_\_\_ H2O
8. \_\_\_\_ CH4 + \_\_\_\_ O2 🡪 \_\_\_\_ CO2 + \_\_\_\_ H2O
9. \_\_\_\_ C3H8 + \_\_\_\_ O2 🡪 \_\_\_\_ CO2 + \_\_\_\_ H2O

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Objective: SWBAT define and describe the characteristics of synthesis and decomposition reactions.** |

Class Notes:

**Synthesis and Decomposition Reactions**

**(Textbook Pages 276 – 280)**

**A synthesis or composition reaction** is a reaction in which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Examples of a Synthesis Reaction:

1. 2Mg(s) + O2(g) –-> 2MgO(s)

2.

3.

4.

If an element combines with oxygen, it is said to produce an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of that element.

If an element combines sulfur, it is said to produce a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of that element.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**A decomposition reaction** is a reaction in which a single compound \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Decomposition reactions only occur if \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is added.

***Examples of Decomposition Reactions:***

1. 2HgO(s) 2Hg(l) + O2(g)

2.

3.

4.

The little triangle above the arrow means \_\_\_\_\_\_\_\_\_\_\_\_\_\_ has been added.

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Objective: SWBAT define and describe the characteristics of synthesis and decomposition reactions.** |

Class Work:

1. Which of the following chemical equations signify a synthesis (composition) reaction?
2. 2H2O(l) + electricity -🡪2H2(g) + O2(g)
3. CaO(s) + H2O(l) 🡪 Ca(OH)­2(s)
4. 2HgO(s) 2Hg(l) + O2(g)
5. Which of the following chemical equations signify a decomposition reaction?
6. Mg(s) + F2(g) 🡪 MgF­2(s)
7. Sr(s) + Br2(l) 🡪SrB­2(s)
8. CaCO­3(s) CaO(s) + CO2(g)
9. Classify the following chemical equations as either a synthesis or decomposition reaction.

* Ca(OH)2(s) CaO(s) + H­2O(g)
* H­2SO4(aq) SO3(g) + H­2O(l)
* U(s) + 3F2 (g) 🡪 UF6(g)
* 2Na(s) + Br­2 (l) 🡪2NaBr (s)
* SO­2(g) + H­2O(l) 🡪 H­2SO­3(aq)

1. What must be added for a decomposition reaction to occur?

**Reinforcement**

1. What are some signs of a chemical reaction?
2. What does “(g)” signify in a chemical equation?
3. What does the little triangle above an arrow signify?
4. Is the following chemical equation balanced?

CS2(l) + 3O2(g) 🡪 CO2(g) + 2SO2(g)

1. Balance the following equation:

Al4C3(s) + H2O(l) 🡪 CH­4(g) + Al(OH)2(s)

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| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Objective: SWBAT define and describe the characteristics of a single replacement, double-replacement, and combustion reaction.** |

**Single Replacement, Double Replacement, and Combustion Reactions**

**(Textbook Pages 281 – 284)**

**A single-displacement (replacement)reaction** is a reaction in which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

IN GENERAL, a single-displacement reaction has the following format:

A + BX 🡪 AX + B

OR

Y + BX 🡪 BY + X

*Examples of a Single-Displacement Reaction*:

1. 2Al(s) + 3Pb(NO3)2(aq) 🡪 3Pb(s) + 2Al(NO3)3(aq)

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**A double-displacement reaction** is a reaction in which the ions of two compounds switch places in an aqueous solution to form two new compounds.

IN GENERAL, a double-displacement reaction has the following format:

AX + BY 🡪 AY + BX

*Examples of a Double-Displacement Reaction*:

1. 2KI(aq) + Pb(NO3)2(aq) 🡪 PbI2(s) + 2KNO­3(aq)

2.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

**A combustion reaction** is a reaction in which a substance combines with oxygen, releasing energy in the form of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

*Examples of a Combustion*

1. 2H2(g) + O2(g) 🡪 2H2O(g)

|  |
| --- |
| **Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**  **Objective: SWBAT define and describe the characteristics of a single displacement, double-displacement, and combustion reaction.** |

1. Classify the following compounds as a single-displacement (SD), double-displacement (DD), or combustion (C ), synthesis (S), or decomposition (D).
2. HCl(aq) + NaOH(aq) 🡪 NaCl(aq) + H2O
3. Mg(s) + 2HCl(aq) 🡪 H2(g) + MgCl2(aq)
4. 2C6H14(l) + 19O2 (g) 🡪 12CO2(g) + 14H2O(l)
5. K2CO3 (aq) + CuSO4 (aq) 🡪 CuCO3 + K2SO4
6. K2CO3 (aq) + AgNO3 (aq) 🡪 Ag2CO3 + KNO3
7. H2SO4 + Zn 🡪 ZnSO4 + H2
8. Co(OH)3 + HNO3 🡪 Co(NO3)3 + HOH
9. KOH + H2SO4 🡪 K2SO4 + HOH
10. KI + Cl2 🡪 KCl + I2
11. H2 + O2 🡪 H2O
12. ZnS + O2 🡪 ZnO + S
13. Balance the equations below.

* \_\_\_\_\_  Na2O2  +   \_\_\_\_\_  H2SO4  -->   \_\_\_\_\_  Na2SO4  +   \_\_\_\_\_  H2O2
* \_\_\_\_\_  N2  +   \_\_\_\_\_  H2  -->   \_\_\_\_\_  NH3
* \_\_\_\_\_  Al  +   \_\_\_\_\_  O2  -->   \_\_\_\_\_  Al2O3
* KMnO4  -->   \_\_\_\_\_  K2O  +   \_\_\_\_\_   MnO  +   \_\_\_\_\_  O2

**Make sure Mr. Gutierrez stamps/signs this by the end of the period. You CANNOT get the stamp/signature for a day later on. It is your responsibility to remind Mr. Gutierrez. You will NOT receive a stamp if you did not follow all classroom policies or actively work on the practice problems during the allotted class time.**

|  |  |  |
| --- | --- | --- |
| **Followed All Classroom Policies**  **(Be respectful, on time, prepared and engaged…)** | | **Class work Participation**  **(Working on packet during allotted time)** |
| /20 | Monday | /20 |
| /20 | Tuesday | /20 |
| /20 | Wednesday | /20 |
| /20 | Thursday | /20 |
| /20 | Friday | /20 |