**Elements, Compounds, and their Drama!!**

Intro to Chemical Reaction Types

Chemical reactions can be classified into different categories. Four common types are composition, decomposition, single replacement and ionic reactions. Specific reactions corresponding to these general types are associated with health issues, environmental problems, and manufacturing processes. In order to use chemical reactions or evaluate their effects, you need to be able to identify the type of reaction.

**Model 1: Types of Reactions**

|  |  |  |  |
| --- | --- | --- | --- |
| **Classification (Type) of Reaction** | **Example: Using Symbols** | **Example Reactions** | **Description of how the atoms are being REARRANGED** |
| Synthesis/  Composition | A + B AB | H2(g) + 2O2(g) 2H2O(l) | elements or less complex compounds come together to form a single more complex compound |
| Decomposition | XY  X + Y | 2H2O(l)  H2(g) + 2O2(g) | a compound breaks apart into either elements or less complex compounds |
| Single Replacement | A + BCAC + B | Al(s) + Cu(NO3)2(aq) Al(NO3)3(aq) + Cu(s) | a single element replaces another one in a compound |
| Double Replacement/Ionic | AC + DEAE + DC | Pb(NO3)2(aq) + KI(aq) PbI2(s) + KNO3(aq) | ions in a compound switch places with ions in another compound to form two new compounds |

1. As shown in the model, what are the unique characteristics of a synthesis reaction?

2. As shown in the model, what are the unique characteristics of a decomposition reaction?

3. As shown in the model, what are the unique characteristics of a single replacement reaction?

4. As shown in the model, what are the unique characteristics of a double replacement or ionic reaction?

Describe in sentences how the atoms of each element are rearranged during the following chemical reactions:

KClO3(s) 2KCl(s) + 3O2(g)

5.

AgNO3(aq) + KCl(aq) AgCl(s) + KNO3(aq)

6.

**Model 2: Analogy – Dancing with Reactants**

When you are thinking about the four different types of reactions, I’d like you to think about its similarity to dancing.

*The Dance…*

Amy and Bob were both single. No one was talking about “Amy and Bob” 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 Amy without Bob, they are forever referred to as “Amy and Bob”.

**Analysis of the Dancing Model for Chemical Reactions**

1. Represent the drama of Amy and Bob described in Model 2 as a chemical equation. Use A to represent Amy and B to represent Bob.

2. This equation would be classified as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reaction.

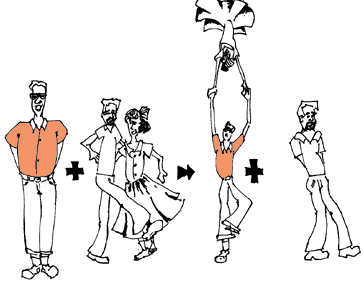
*The Dance continues…*

Later that same evening Xavier and Yasmine, who have been ‘the couple’ forever,have a heated quarrel and break up.

5. Represent the drama of Xavier and Yasmine as a chemical equation. Use X to represent Xavier and Y to represent Yasmine.

6. This equation would be classified as a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reaction.

7. What type of reaction is represented in the picture below? Write your own analogy for the reaction illustrated in the picture.



<http://www.usoe.k12.ut.us/curr/science/sciber00/8th/matter/sciber/chemtype.htm>

(Answer)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Use one sentence to explain how the atoms are rearranged during each reaction. Then, Identify the type of reaction in each of the following chemical equations:

8. 2H2(g) + O2(g) 2H2O(g)

9. 2AgNO3(aq) + Cu(s) Cu(NO3)2(aq) + 2Ag(s)

10. CaCO3(s) CaO(s) + CO2(g)

11. NaI(aq) + Cl2(g) 2NaCl(aq) + I2(s)