**Decomposition Reactions: Carbonates, Chlorates, Hydrates**

\**focus on carbonates for this test*

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| |  | | --- | | **Carbonates** are compounds formed between a metal and the carbonate ion, (CO3)2-. When a carbonate decomposes, a metal oxide and carbon dioxide gas are produced. The general pattern of a decomposition of a carbonate reaction is:         MCO3 --> MO + CO2 (M is used to represent the metal. CO3 is carbonate.) Look at the example below. **Example #1:**       Na2CO3(s) --> Na2O(s) + CO2(g)  Sodium carbonate decomposes to form sodium oxide and carbon dioxide gas. | | Now let’s go step by step. Predict the products when solid calcium carbonate decomposes.   |  |  | | --- | --- | | **Description of Action** | **Action** | | 1. Write the formula for the given reactant. | CaCO3(s) --> | | 2. On the products side of the equation, write the formulas for the metal oxide and carbon dioxide gas separated by a + sign. Be sure to remember to cross charges between the metal and oxygen when writing the formula for the metal oxide. | CaCO3(s) --> CaO(s) + CO2(g) | | 3. Balance the equation | CaCO3(s) --> CaO(s) + CO2(g)  (It is already balanced.) | | |
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**Chlorates** are compounds formed between a metal and the chlorate ion, (ClO3)1-. When a chlorate decomposes, a metal chloride and oxygen gas are produced. Chlorates are often referred to as oxidizers because they produce their own oxygen when they react. The general pattern of a decomposition of a chlorate reaction is:  
        MClO3 --> MCl + O2 (M is used to represent the metal. ClO3 is chlorate.)  
Look at the example below.  
**Example #1:**  
      2KClO3(s) --> 2KCl(s) + 3O2(g)   
Potassium chlorate decomposes to form potassium chloride and oxygen gas. Oxygen is a diatomic molecule and must be written with a subscript of 2.

Now let’s go step by step.  
Predict the products when solid magnesium chlorate decomposes.

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| **Description of Action** | **Action** |
| 1. Write the formula for the given reactant. | Mg(ClO3)2(s) --> |
| 2. On the products side of the equation, write the formulas for the metal chloride and oxygen gas separated by a + sign. Be sure to remember to cross charges between the metal and chlorine when writing the formula for the metal chloride. | Mg(ClO3)2(s) --> MgCl2(s) + O2(g) |
| 3. Balance the equation | Mg(ClO3)2(s) --> MgCl2(s) + 3O2(g) |
| **Hydrates** are compounds that readily absorb water into their crystal structure. When a hydrate decomposes, water is removed. The general pattern of a decomposition of a hydrate reaction is:         AB\**x*H2O --> AB + xH2O Look at the example below. **Example #1:**        BaI2 \* 2H2O(s) --> BaI2(s) + 2H2O(l)  Barium iodide dihydrate decomposes (usually by adding heat) to release water vapor. | |
| Now let’s go step by step. Predict the products when solid copper(II) sulfate pentahydrate decomposes.   |  |  | | --- | --- | | **Description of Action** | **Action** | | 1. Write the formula for the given reactant. | CuSO4 \* 5H2O(s) --> | | 2. On the products side of the equation,separate the water from the salt with a plus sign. The formula of the salt is unchanged. The number of water molecules in the hydrate formula should be used as the coefficient for the water molecule. | CuSO4 \* 5H2O(s) --> CuSO4(s) + 5H2O(g | | |