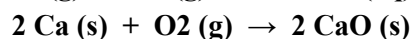
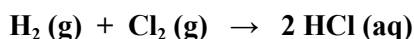


Chem Activity 09 - 07 7 Reteach Chemical Reactions - Classify and Predict Chemical Equations**SYNTHESIS AND DECOMPOSITION REACTIONS**

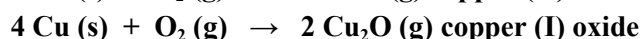
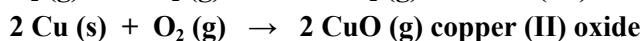
Synthesis reactions and decomposition reactions do just what their names suggest. In a synthesis reaction, two or more substances combine to form a single new substance. The reactants in a synthesis reaction can be either elements or compounds but the product is always a compound. In a decomposition reaction a single compound is broken down into two or more substances. However, it should not be concluded that the opposite of a decomposition reaction is a synthesis reaction. Most decomposition reactions are driven by energy. Heat, light, or electricity is needed to break apart the chemical bonds of the compound. On the other hand, in synthesis reactions the formation of the compounds is usually spontaneous.

There are four varieties of synthesis reactions based on the kinds of reactants present.

1. Group A metal cations combine with nonmetal anions:



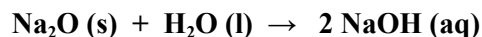
2. Two nonmetals react with each other or a transition metal reacts with a nonmetal. Keep in mind that transition metals can carry more than one charge and nonmetals can combine in more than one way. Thus, more than one product is possible in either case.



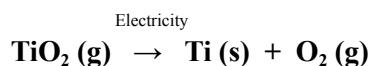
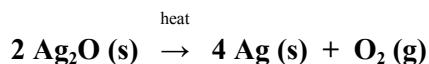
3. Nonmetal oxides react with water to form acids, compound that produce hydrogen ions (H^+) when combined with water.



4. Metallic oxides react with water to form bases, compounds that contain hydroxide ions (OH^-).



In decomposition reactions it is more difficult to determine the products because compounds may decompose either partially or completely. While compounds containing only two kinds of elements (binary compounds) will separate into those two elements, the decomposition of compounds with three or more elements is less predictable. As one balances the equations, they must keep in mind which elements are diatomic molecules.

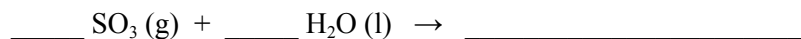
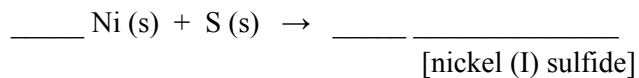
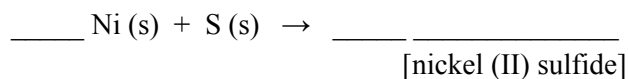
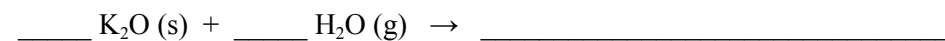
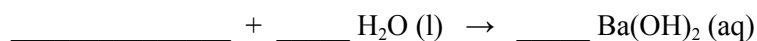
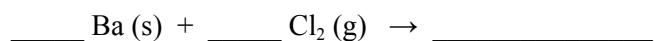


Apply

1. Why would there be two possible reactions and two different products when iron combines with oxygen?

2. What substances need to react together to produce an acid?

3. How can a base be produced?

4. Complete and balance the following equations:

SINGLE AND DOUBLE REPLACEMENT REACTIONS

In single replacement reactions, atoms of an element switch places with atoms of a second element in a compound. In a double replacement reaction, positive ions exchange places between two compounds.

In single replacement reactions, metals may be exchanged between reactants. Not all metals give up their position in their compound to another metal. Different metals have different levels of reactivity to each other. The Activity Series lists metals in orders of decreasing reactivity. A reactive metal replaces any metal listed below in the activity series table. For example, a lithium atom can replace a potassium atom, but a potassium atom cannot replace a lithium atom.

Halogens (F_2 , Cl_2 , Br_2 , and I_2) decrease as one goes down Group VIIA of the periodic table.

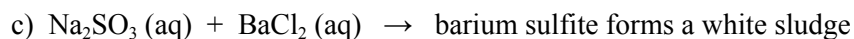
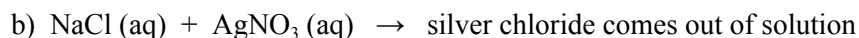
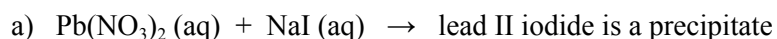
Apply

1. If these reactions will occur, write balanced equations for each of these single replacement reactions:

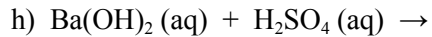
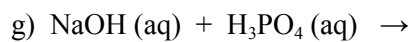
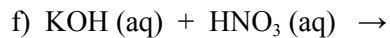
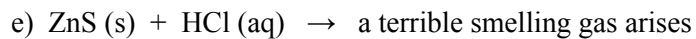
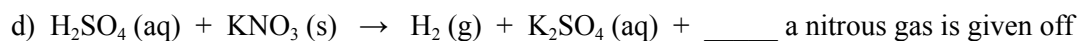


Double replacement reactions can often be dramatic visually. A product can precipitate. A gas may be given off. Water is produced with an acid is mixed with a base.

2. Write balanced equations for each of these double replacement reactions.



Write the balanced equation for each of these double replacement reactions:



3. In the previous reactions,

Reactions a through c each produce a _____.

Reactions d through e each produce a _____.

Reactions g and h each produce _____.