



- Solid calcium chloride is heated strongly.  
 $\text{CaCl}_2 \rightarrow \text{Ca} + \text{Cl}_2$
- Electricity is passed through water causing it to decompose.  
 $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
- Solid sodium chlorate is strongly heated.  
 $2\text{NaClO}_3 \rightarrow 2\text{NaCl} + 3\text{O}_2$
- Solid copper(II) sulfate pentahydrate is heated strongly.  
 $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \rightarrow \text{CuSO}_4 + 5\text{H}_2\text{O}$
- Solid calcium carbonate is strongly heated.  
 $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$

14. **Combustion:** Write complete balance chemical reaction for each of the following.

- Solid nickel(II) sulfide is strongly heated in air.  
 $2\text{NiS} + 3\text{O}_2 \rightarrow 2\text{NiO} + 2\text{SO}_2$
- Hexane ( $\text{C}_6\text{H}_{14}$ ) is combusted in air.  
 $2\text{C}_6\text{H}_{14} + 19\text{O}_2 \rightarrow 12\text{CO}_2 + 14\text{H}_2\text{O}$
- Propanone ( $\text{CH}_3\text{COCH}_3$ ) is burned in air.  
 $\text{CH}_3\text{COCH}_3 + 4\text{O}_2 \rightarrow 3\text{CO}_2 + 3\text{H}_2\text{O}$
- Sulfur in its standard state is burned in air.  
 $\text{S}_8 + 8\text{O}_2 \rightarrow 8\text{SO}_2$

15. **Modified True/False.** If a statement is true, circle true. If a statement is false, circle false and rewrite the statement making it true.:

- False** - When solving double(**single**) displacement equations, you must look at the activity series to see if the reaction can occur.
- True** - In order for a combustion reaction to occur, oxygen is needed as a reactant.
- False** - Decomposition reactions never(**sometimes**) have compounds in their products.
- True** - In the decomposition of a hydrate, the water is removed from the hydrate and is written as a separate product.
- False** - In the decomposition of a chlorate(**carbonate**), carbon dioxide is always one of the products.
- False** - When using a multivalent cation, you can(**can't**) use a different charge in your reactant and your product

16. **Mixed Problems.** For each of the following reactions, write a balanced equation for the reaction. Coefficients should be in terms of lowest whole numbers.

- Magnesium metal is burned in nitrogen gas.  
 $3\text{Mg} + \text{N}_2 \rightarrow \text{Mg}_3\text{N}_2$
- Lead foil is immersed in silver nitrate solution.  
 $\text{Pb} + 2\text{AgNO}_3 \rightarrow \text{Pb}(\text{NO}_3)_2 + 2\text{Ag}$        $\text{Pb} + 4\text{AgNO}_3 \rightarrow \text{Pb}(\text{NO}_3)_4 + 4\text{Ag}$
- A solution of ammonium sulfate is added to a solution of barium hydroxide.  
 $(\text{NH}_4)_2\text{SO}_4 + \text{Ba}(\text{OH})_2 \rightarrow \text{BaSO}_4 + 2\text{NH}_4\text{OH}$
- Ethanol ( $\text{C}_2\text{H}_5\text{OH}$ ) is completely burned in air.  
 $\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$
- Solutions of zinc sulfate and sodium phosphate are mixed.  
 $3\text{ZnSO}_4 + 2\text{Na}_3\text{PO}_4 \rightarrow \text{Zn}_3(\text{PO}_4)_2 + 3\text{Na}_2\text{SO}_4$
- Solutions of silver nitrate and lithium bromide are mixed.  
 $\text{AgNO}_3 + \text{LiBr} \rightarrow \text{LiNO}_3 + \text{AgBr}$
- A solution of ammonium thiocyanate is added to a solution of iron(II) chloride.  
 $2\text{NH}_4\text{SCN} + \text{FeCl}_2 \rightarrow \text{Fe}(\text{SCN})_2 + 2\text{NH}_4\text{Cl}$
- Carbon disulfide vapor is burned in excess oxygen.  
 $\text{CS}_2 + 3\text{O}_2 \rightarrow \text{CO}_2 + 2\text{SO}_2$
- A solution of sodium hydroxide is added to a solution of ammonium chloride.  
 $\text{NaOH} + \text{NH}_4\text{Cl} \rightarrow \text{NaCl} + \text{NH}_4\text{OH}$