

# Limiting Reactants

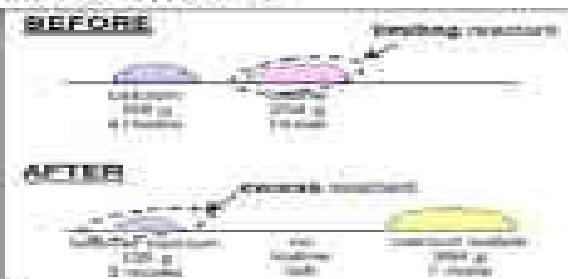
## Chem Worksheet 12-3

Name \_\_\_\_\_

When an electrolytic production plant runs out of time no more calcium can be produced even if there are still plenty of calcium, sodium, sulfate, and other parts. When one of the reactants in a chemical reaction runs out the reaction stops as well. The substance that limits production in a chemical reaction is known as the **limiting reactant**. The reactant that is left over when the reaction stops is called the **excess reactant**.



Consider the chemical reaction between calcium and iodine. When 199 g (4 moles) of calcium reacts with 254 g (1 mole) of iodine the reaction makes 294 g (1 mole) of calcium iodide. Although there is enough calcium to make more calcium iodide, the iodine runs out first. Since all of the iodine gets used up it is called the **limiting reactant**. According to the balanced equation, if one mole of iodine reacts, one mole of calcium will react. This means that there are still 3 moles of calcium left. Because calcium is left over it is called the **excess reactant**.



### Example

What mass of bromine (Br<sub>2</sub>) and PbBr<sub>2</sub> will be produced if 7.99 g of iodine reacts with 29.6 g of PbBr<sub>2</sub>?

Balance the equation.



Find the molar ratios for each reactant.



What is the limiting reactant? Iodine is present in excess, so iodine is the limiting reactant.

How is the limiting reactant? There is enough iodine to make 17.92 g of Br<sub>2</sub>, but only enough PbBr<sub>2</sub> to make 15.54 g of PbI<sub>2</sub>.

Find the amount of product formed in each of the following reactions.

1. What mass of H<sub>2</sub>O will be produced if 9.5 g of H<sub>2</sub> reacts with 1.2 g of O<sub>2</sub>?



2. If 1.85 g of Mg(OH)<sub>2</sub> reacts with 3.71 g of HCl, how much MgCl<sub>2</sub> is produced? What is the limiting reactant?



3. What mass of AgCl is produced when 37.42 g of AgNO<sub>3</sub> reacts with 14.39 g of NaCl?



4. If 14.7 g of calcium is placed in 31.2 g of water, what mass of hydrogen gas is produced?



5. What mass of potassium hydroxide is formed when 8.2 g of potassium iodide is added to 1.9 g of water?



6. What mass of aluminum chloride could be made from 8.1 g of aluminum and 4.2 L of chlorine at STP?



7. If 5.26 L of nitrogen monoxide and 7.64 L of oxygen are combined, what mass of nitrogen dioxide is formed? Assume conditions are STP.



8. If 16.1 g of calcium nitrate reacts with 8.4 L of hydrogen at STP, what mass of nitrogen is formed?



9. What mass of Cu(OH)<sub>2</sub> is produced in the reaction of 2.6 g Cu(NO<sub>3</sub>)<sub>2</sub> with 6.2 g of KOH?



10. What mass of carbon dioxide is formed when 64 kg of ethyl acetate is heated in 242 kg of oxygen?



# Limiting Reactions Chem Worksheet 12 3 Answers Key

**Frank Schaffer Publications,Joan  
DiStasio**

## **Limiting Reactions Chem Worksheet 12 3 Answers Key:**

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