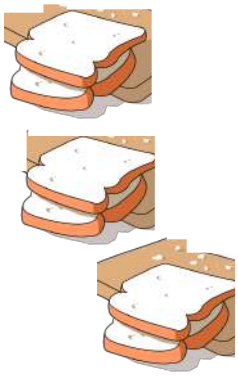
Limiting Reactants



How many PBJ's can you make??

- Usually during a reaction, there is more of one reactant than necessary

- e.g. during combustion, usually there is an excess of O2

- The reactant that runs out first is called the Limiting Reactant

- The leftover reactant(s) are said to be in excess

If 5.0 g of Mg is reacted in a jar with 0.50 L O_2 (g),

a. What is limiting?

b. What mass of MgO is formed?

c. How much excess reactant is left over?

Balanced Equation: $O_{2(g)} + 2Mg_{(s)} \rightarrow 2MgO_{(s)}$

Convert to moles:

Mg: 5.0 g x 1.00 mol/24.0 g = 0.21 mol Mg

O_2: 0.50 L x 1.00 mol/22.4 L = 0.022mol O_2

All $0.022\ mol\ O_2$ reacts

$1\ O_2 : 2\ MgO$

$0.022\ mol\ O_2 \cdot \frac{2\ mol\ MgO}{1\ mol\ O_2} =$

$0.044\ mol\ MgO \cdot \frac{40\ g\ MgO}{1\ mol} =$

$1.8\ g\ MgO$

$2Mg(s) + O_{2(g)} \rightarrow 2MgO(s)$

Look at molar ratio 2Mg: 1 O_2 :2MgO

c. Mg is the excess reactant, used 0.044 mol

$$0.044 \text{ mol Mg} \times \frac{24.0 \text{ g Mg}}{1.00 \text{ mol Mg}} = 1.1 \text{ g Mg}$$

Started with 5.0g Mg

5.0 g Mg - 1.1 g Mg = 3.9 g Mg left over