

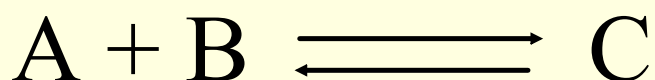
Homework #1-5

0.2 mol / month

Chemical Equilibrium

Reversible Reaction

Reaction in which both the forward and reverse processes are occurring simultaneously.

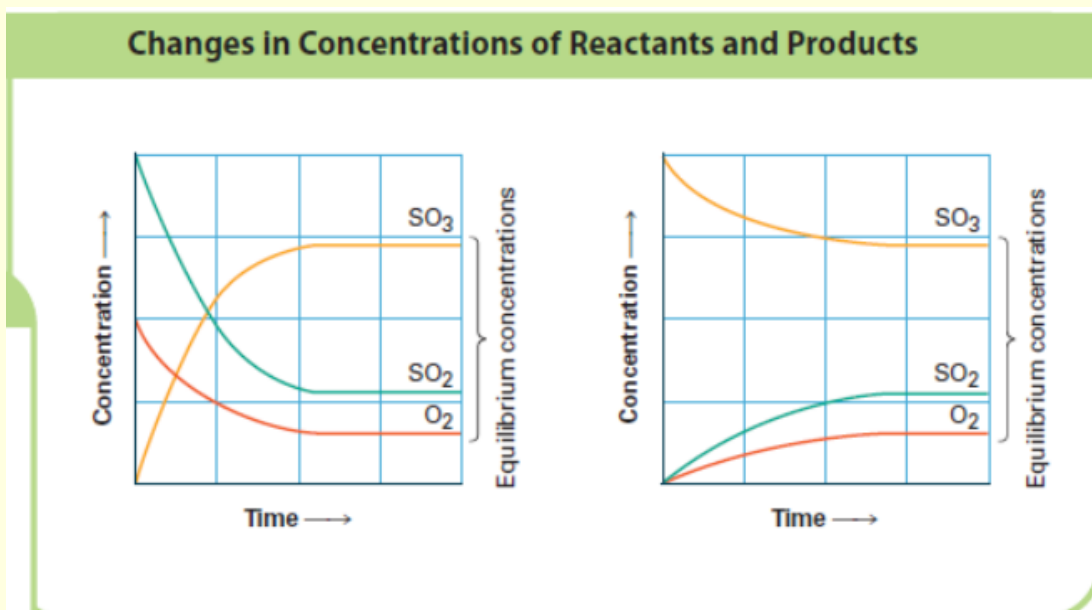


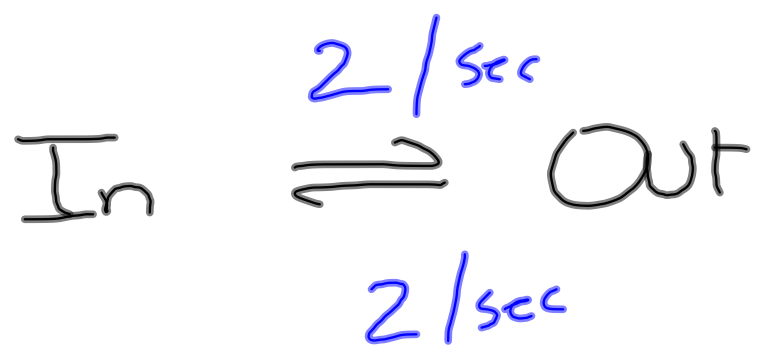
Chemical equilibrium

A system is said to have reached chemical equilibrium when the forward and reverse reactions are occurring at the same rate.

→ no net change occurs in the concentration of components of the system

<http://www.chm.davidson.edu/ronutt/che115/EquKin/EquKin.htm>





Percent Reaction

Percent Reaction (percent yield) - is the amount of product measured at equilibrium compared with the maximum possible amount of product.

Equilibrium position

relative concentration of reactants and products at equilibrium

⇒ 0 % indicates no product formed

⇒ 100 % indicates the maximum possible product formed

- maximum amount of possible product is found using stoichiometry, assuming a forward reaction with no reverse reaction.

$$\% \text{ reaction} = \frac{\text{Experimental yield}}{\text{Theoretical yield (maximum)}} \times 100 \%$$

← @ eqm.

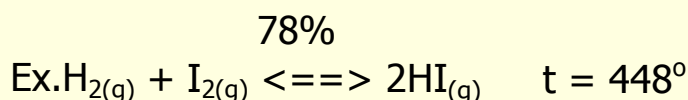
Classifying Chemical Equilibria

< 50 % - reactants favored

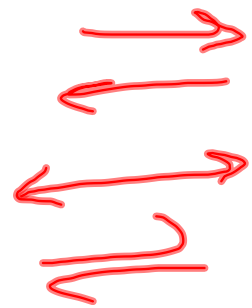
> 50 % - products favored

> 99 % - quantitative →

The equilibrium position of the reaction is indicated in the following manner :



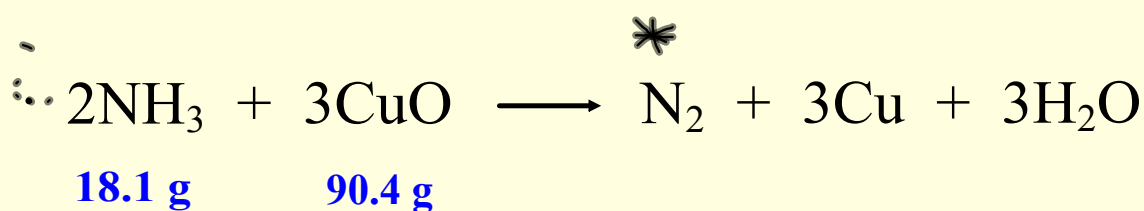
Indicates that 78 % of the total amount of HI possible is produced at 448°C. Therefore this is a **product** favored reaction.



Limiting Reagent

In a chemical reaction, the reactant that will "run out" first is called the **limiting reagent**.

The other reactant is called the **excess reagent**.



Find max. product

IF NH_3 is L.R.:

$$18.1 \text{ g NH}_3 \times \frac{1 \text{ mol NH}_3}{17.04 \text{ g NH}_3} \times \frac{1 \text{ mol N}_2}{2 \text{ mol NH}_3} \times \frac{28.02 \text{ g N}_2}{1 \text{ mol N}_2} = 14.88 \text{ g N}_2$$

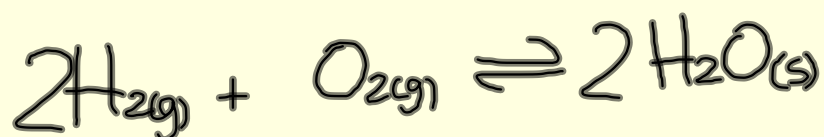
IF CuO is L.R.:

$$90.4 \text{ g CuO} \times \frac{1 \text{ mol CuO}}{79.54 \text{ g CuO}} \times \frac{1 \text{ mol N}_2}{3 \text{ mol CuO}} \times \frac{28.02 \text{ g N}_2}{1 \text{ mol N}_2} = 10.62 \text{ g N}_2$$

CuO is L.R.

SAMPLE PROBLEM : % REACTION

Find the % reaction and write the expression if 6.90 g of $\text{H}_{2(g)}$ and 32.0 g of $\text{O}_{2(g)}$ react to form 25.75 g of ice at -70 C° .



theor. 6.90g

32.0g

exp.

25.75g

$$\% \text{rxn} = \frac{\text{exp.}}{\text{theor.}} \times 100\%$$