# Homework #1-5

Round the following number to three significant digits:

-249647 kJ

- 249000 kJ (-1)

- 250. MJ

$-2.50 \times 10^5$ kJ

# Factors Affecting Reaction Rates

**Temperature**
Raising the temperature speeds up the rate of reaction
- More collisions, and more particles with enough kinetic energy to overcome activation energy barrier

Ex. burning of charcoal

**Concentration**
Increased concentration increases rate of reaction
- More particles, more collisions, higher rate of reaction

Ex. glowing splint in pure oxygen

**Particle Size**
Larger the particle, slower the rate of reaction
- Larger particle, less surface area, less reactant available for collision

Ex. Burning log in a fire

**Catalyst**
Lowers the activation energy for a reaction, increasing rate of reaction
- Not consumed in chemical reaction

Ex. Enzymes in digestive tract

**Inhibitor** - substance that interferes with the action of a catalyst, often by reacting with the catalyst

# Chemical Equilibrium

## Reversible Reaction

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

$A + B \rightleftharpoons C$

$A + B \rightarrow C$

$C \rightarrow A + B$

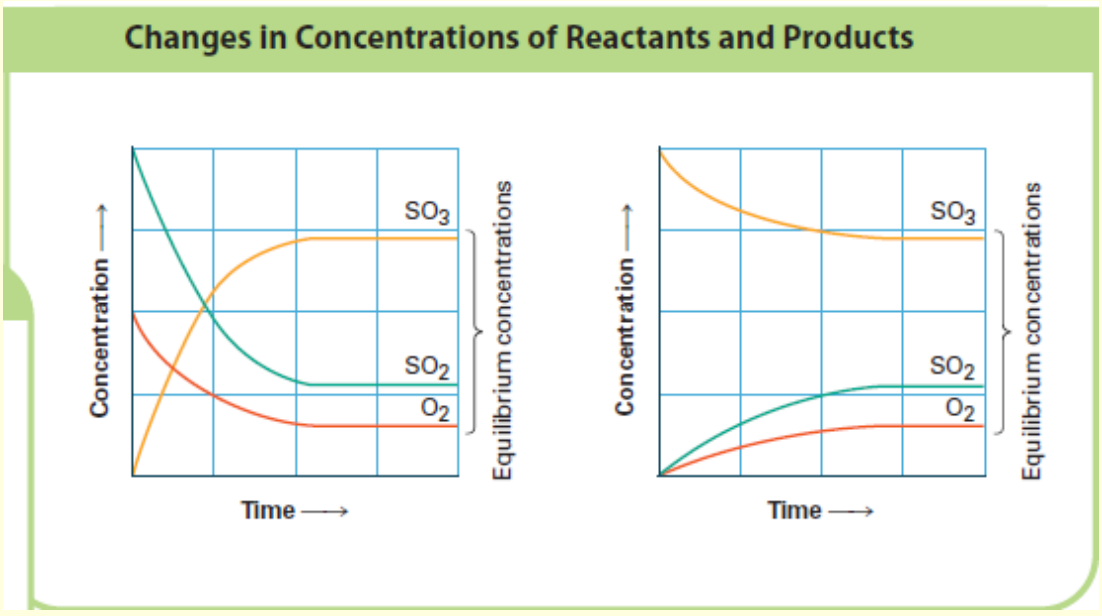
$A + B \rightleftharpoons C$ $\longleftrightarrow$

## Chemical equilibrium

A system is said to have reached chemical equilibrium when the forward and reverse reactions are occuring 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



$$In \rightleftharpoons Out$$

18 1 Eqm.

$$N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$$

# 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**.

$$2NH_3 + 3CuO \longrightarrow N_2 + 3Cu + 3H_2O$$

**18.1 g** **90.4 g**

IF $NH_3$ is L.R.:

$$18.1\,g\,NH_3 \times \frac{1\,mol\,NH_3}{17.04\,g\,NH_3} \times \frac{1\,mol\,N_2}{2\,mol\,NH_3} \times \frac{28.02\,g\,N_2}{1\,mol\,N_2} = 14.88\,g\,N_2$$

IF CuO is L.R.:

$$90.4\,g\,CuO \times \frac{1\,mol\,CuO}{79.54\,g\,CuO} \times \frac{1\,mol\,N_2}{3\,mol\,CuO} \times \frac{28.02\,g\,N_2}{1\,mol\,N_2} =$$

$10.62\,g\,N_2$

CuO is L.R.

How much $NH_3$ remains?