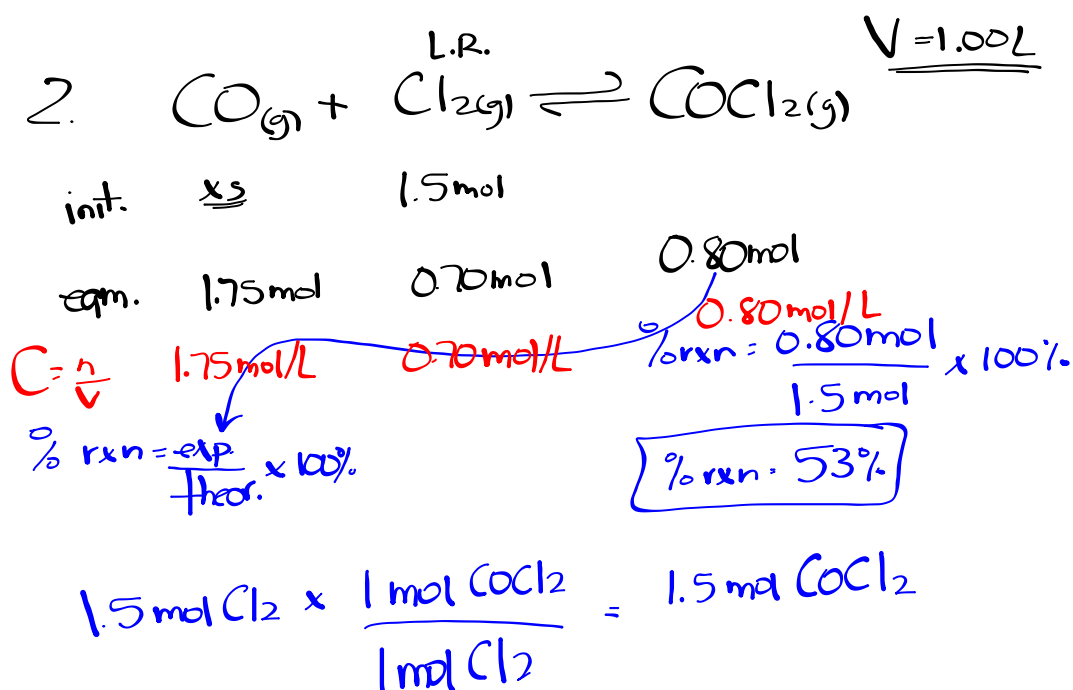
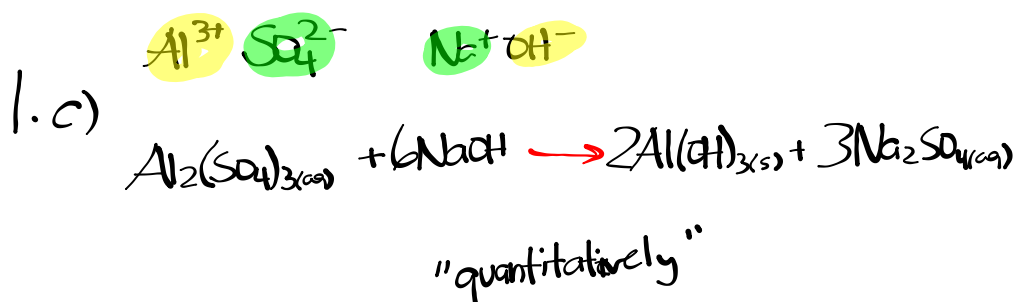


## Homework - Worksheet



b)  $K = \frac{[\text{COCl}_2(\text{g})]}{[\text{CO}(\text{g})][\text{Cl}_2(\text{g})]}$

$K = \frac{[0.80]}{[1.75][0.70]}$

$K = 0.65$

## Change in Equilibrium Conditions

A complete description of an equilibrium state of a system must indicate temperature, pressure, composition and concentrations of all entities.

(A percent reaction or equilibrium constant may be part of the the description.)

\*There are as many states of equilibrium of a chemical system as there are combinations of properties.\*

### Le Chatelier's Principle

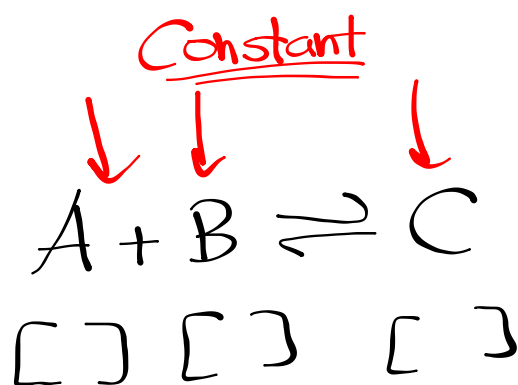
If a stress is applied to a system in dynamic equilibrium, the system changes in a way that **relieves the stress**, to **re-achieve equilibrium**.

- is a method of predicting in which direction an equilibrium will shift if the factors describing an equilibrium state (temperature, pressure, concentration) are changed.

- is useful in order to choose conditions which maximize the production of the desired product.

\***catalysts** speed up the time to reach equilibrium but do not affect the final position of an equilibrium\*

**Summary p. 492: Variables Affecting Chemical Equilibria**

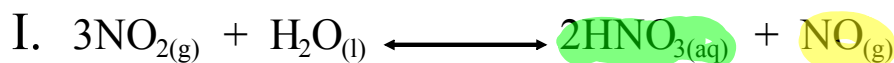


$$T = 448^{\circ}\text{C}$$

K

% rxn

## Concentration



⇒ remove  $\text{NO}_{(\text{g})}$

shift right

⇒ add  $\text{HNO}_{3(\text{aq})}$

shift left

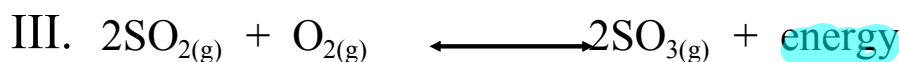
## Temperature



⇒ heat system



\*think of energy as an entity in the equation



⇒ cool system (low T)

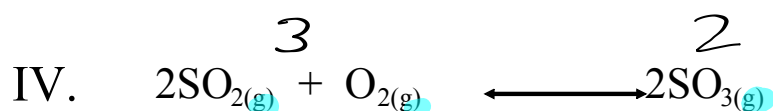


## Pressure / Volume

⇒ look at gaseous entities

$$PV = nRT$$

$$P = \frac{nRT}{V}$$



⇒ decrease volume (increase pressure) →

⇒ increase volume (decrease pressure) ←

# Worksheet