

## A Few Questions About Rates and Equilibrium

1. USE THE FOLLOWING DATA FOR THE REACTION:  $A + B \rightarrow C$

	Conc. A(M)	Conc. B(M)	Rate M/s
Exp. 1	2	2	4
Exp. 2	2	4	16
Exp. 3	10	4	2000

$$[C]_A^x [C]_B^y = C_{Rate}$$

Calc. for ~~B~~

$$1 \cdot 2^y = 4$$

$$y = 2$$

Calc for ~~A~~

$$5^x = 125$$

$$x = 3$$

a. Write the GENERAL rate law

$$r = k [A]^3 [B]^2$$

b. Solve for K--include units.

$$4 \frac{M}{s} = k [2M]^3 [2M]^2$$

$$= k 32M^5$$

$$K = 0.125 \frac{1}{M^4 s}$$

c. Calculate the value of R if A is .20 M and B is .40 M. include units

$$r = k [A]^3 [B]^2$$

$$= .125 \frac{1}{M^4 s} (20)^3 (.40)^2$$

d. What is the overall reaction order?

$$= 1.6 \times 10^{-4} M/s$$

2. For the reaction  $A + B \rightleftharpoons C$  you are given 2 moles of each product and reactant and enough water to make 5 liters of solution. If all substances in the equation are water soluble, which way will the reaction proceed initially in order to reach equilibrium?  $K_c$  for the reaction is .25 **Defend your answer.**

$$K_c = \frac{[C]}{[A][B]}$$

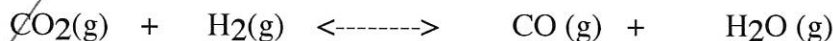
$$= \frac{.4}{(.4)(.4)}$$

$$= 2.5$$

2.5 is  $>$  .25 so Not at equilibrium

is too large so the reaction will proceed left on the way to equilibrium.

3. When the following system is at equilibrium, the concentrations of carbon dioxide and hydrogen are .640 M while the concentration of water is .185 M.



$$K_{eq} = \frac{[CO][H_2O]}{[CO_2][H_2]}$$

a. What is the concentration of the carbon monoxide if the  $K_{eq}$  is .400?

No ICE

$$[CO] = .89 M$$

$$.4 = \frac{[CO](.185)}{(.64)(.64)}$$