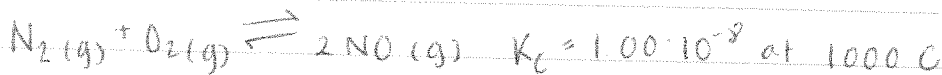


02/13/19

Q and le chatelier's principle

Practice #1

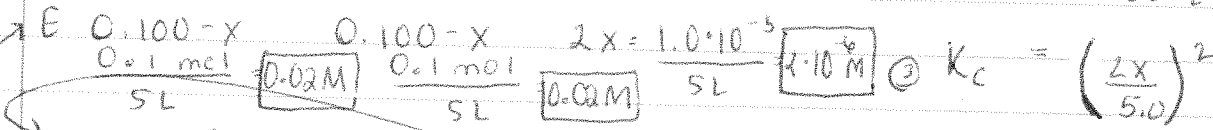


If 0.100 moles of N_2 and O_2 are added to 5.00L reaction vessel, what are equilibrium concentrations of N_2 , O_2 , and NO ?



based on stoich. coefficient.

$$\textcircled{2} K_c = \frac{[\text{NO}]^2}{[\text{N}_2][\text{O}_2]}$$



$$\textcircled{5} K_c = \frac{4x^2}{(0.100)^2} = 1.00 \cdot 10^{-8}$$

$$4x^2 = (1.00 \cdot 10^{-8})(1.00 \cdot 10^{-2})$$

$$4x^2 = 1.00 \cdot 10^{-10}$$

$$x^2 = 1.00 \cdot 10^{-10}$$

$$x = 5.0 \cdot 10^{-6}$$

$\therefore$ Dropping '(x)' was a reasonable assumption. $(1.00 - 5 \cdot 10^{-6}) \approx 1.00$

$$\textcircled{4} K_c = \frac{(2x)^2}{(0.100 - x)^2} = 1.00 \cdot 10^{-8}$$

ignore 'x' in this term b/c we know it's small. (x is less than 5% of 0.100)

Practice #2

Q (RXN quotient)



$$K_c = 5.6$$



GENERAL: equilibrium (ions too)

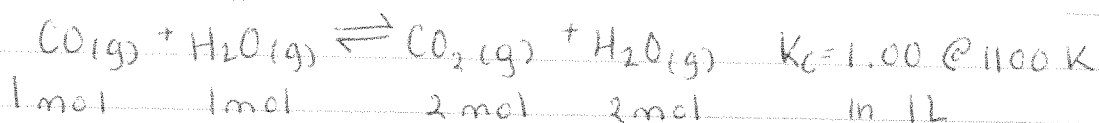
$$Q = \frac{[\text{C}]^c [\text{D}]^d}{[\text{A}]^a [\text{B}]^b}$$

$$Q = \frac{[\text{CO}][\text{H}_2]^3}{[\text{CH}_4][\text{H}_2\text{O}]} = \frac{(0.500)(0.800)^3}{(0.100)(0.200)} = 12.8$$

$$\therefore Q \neq K_c$$

- * If $Q = K_c$, RXN @ equilibrium, no change
- * If $Q > K_c$, there is too much product. RXN will go to left
- * If $Q < K_c$, too much reactant, RXN goes to right.

Practice #3



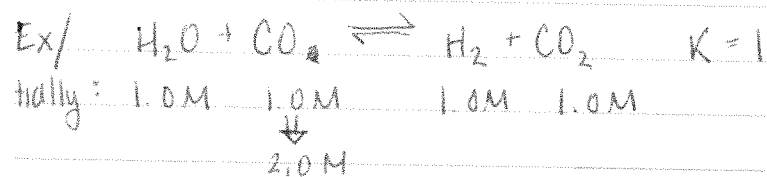
- This system will shift towards reactants until equilibrium reached.

— class demo —



Initial: (Soda at $P = 4 \text{ atm}$) MENTOS:
 • putting mentos in soda, sped up RXN.
 CO_2 placed back into gas phase.

Le Châtelier's Principle - system @ equilibrium disturbed (temp., pressure, entration) the system will shift its equilibrium in order to counteract the effect of disturbance (away).



$$Q = \frac{(1)(1)}{(1)(2)} = \frac{1}{2} \therefore Q < K, \text{ so the RXN goes to the right in order to make more product.}$$

