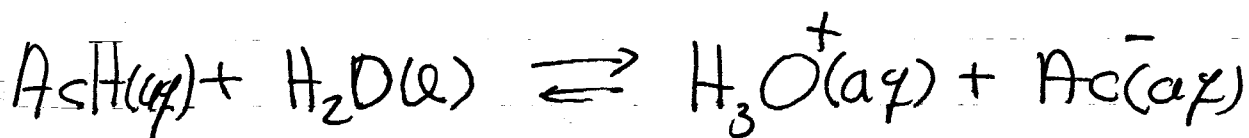


5% Acidity?

5% OF THE TOTAL NUMBER OF ACID MOLECULES ARE DISSOCIATED.



I	X	-	$10^{-7} \approx 0$	0
C	-y	-	y	y
E	X-y		y	y

$$K = \frac{y^2}{(X-y)}$$

$$\frac{y}{X} = 0.05 \quad \text{OR} \quad 20y = X$$

$$K = \frac{y^2}{20y - y} = \frac{y^2}{19y} = \frac{y}{19}$$

$$y = 19K$$

$$X = 380K$$

$$K = 1.76 \times 10^{-5}$$

$$x = 6.69 \times 10^{-3}$$

$$y = 3.34 \times 10^{-4} \ll 10^{-7}$$

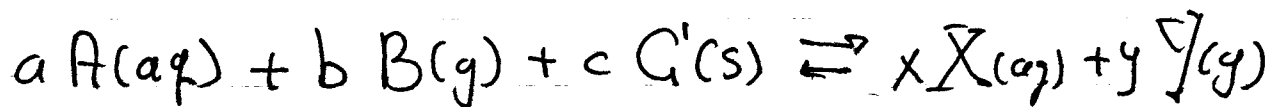
$$[\text{H}_3\text{O}^+] = 3.34 \times 10^{-4} \text{ M}$$

$$\boxed{\text{pH} = 3.476}$$

sig figs

In lab $[\text{AcH}] = 6.69 \times 10^{-3} \text{ M}$

AT EQUILIBRIUM



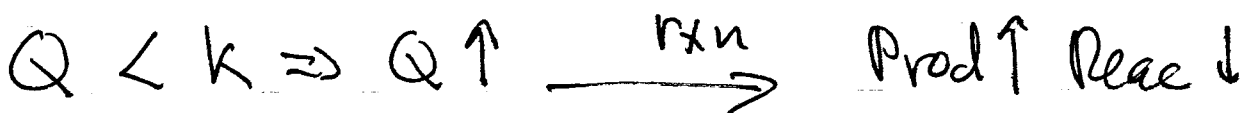
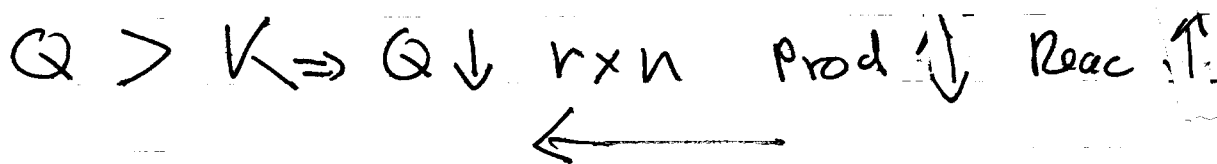
$$K = \frac{([X]^e)^x (P_Y^e)^y}{([A]^e)^a (P_B^e)^b} = \text{CONSTANT } (T, V) \\ \text{(FOR ALL INITIAL CONDITIONS).}$$

DEFINITION REACTION QUOTIENT, Q.

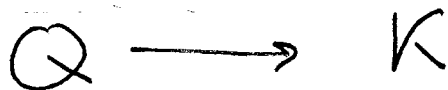
$$Q \equiv \frac{([X]^i)^x (P_Y^i)^y}{([A]^i)^a (P_B^i)^b}$$

FOR ANY INITIAL SET OF CONDITIONS

$$Q \longrightarrow K$$



Le Châtelier principle



Ex. 9.13 and 9.14

NOTICE THAT ONLY PRODUCTS AND REACTANTS APPEAR IN Q AND K .

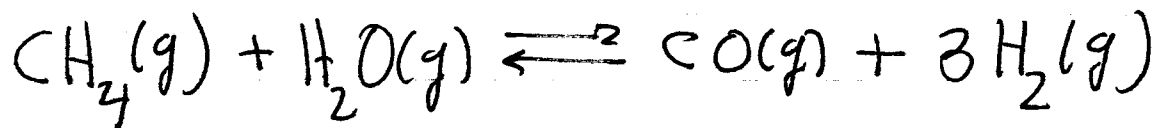
AT EQUILIBRIUM WE CAN SUDDENLY CHANGE

THE VOLUME, TEMPERATURE OR SOME OF

THE PARTIAL PRESSURES.

FROM THE VALUE OF Q , WE CAN PREDICT

THE DIRECTION OF THE RXN.



AT 600 K

$$K = 1.8 \times 10^{-7}$$

	$\text{CH}_4(\text{g})$	$+$	$\text{H}_2\text{O}(\text{g})$	\rightleftharpoons	$\text{CO}(\text{g})$	$+$	$3\text{H}_2(\text{g})$
I	1.40		2.30		1.60		0
C	$-y$		$-y$		$+y$		$+3y$
E	$1.40 - y$		$2.30 - y$		$1.60 + y$		$3y$

$$K = \frac{P_{\text{CO}} (P_{\text{H}_2})^3}{P_{\text{CH}_4} P_{\text{H}_2\text{O}}} = \frac{(1.60 + y)(3y)^3}{(1.40 - y)(2.30 - y)} = 1.8 \times 10^{-7}$$

$$K \ll 1 \Rightarrow y \ll 1$$

$$K \approx \frac{1.60 \cdot 9 \cdot y^3}{(1.40)(2.30)} = 1.8 \times 10^{-7}$$

$$y^3 = 1.34 \times 10^{-8}$$

$$y = 2.39 \times 10^{-3}$$

$$P_{\text{H}_2}^0 = 7.14 \times 10^{-3} \text{ atm}$$