

15.22 $2\text{Cl}_2 + 2\text{H}_2\text{O} \rightleftharpoons 4\text{HCl} + \text{O}_2$ All(gases)

① $\text{Cl}_2 + \text{H}_2\text{O} \rightleftharpoons 2\text{HCl} + \frac{1}{2}\text{O}_2$

$PV = nRT$
 $P = \frac{n}{V}RT$
 $K_p = K_c (RT)^{\Delta n}$
 $\Delta n = n_{\text{prod}} - n_{\text{react}}$

$K_c = K_p (RT)^{-\Delta n}$
 $= (0.274) \left[\frac{0.01206}{753} \right]^{\frac{1}{2}}$
 $= 0.035$

$K_p = 0.274$

$2\frac{1}{2} - 2 = \frac{1}{2}$

Feb 14-7:23 AM

15.32 $\text{H}_2 + \text{Br}_2 \rightleftharpoons 2\text{HBr}$ 2 l

1.374g 70.31g

(I) H_2 $\frac{1.374\text{g H}_2}{2\text{ l}} \left| \frac{1\text{ mole H}_2}{2\text{g H}_2} \right. = 0.3435\text{ M H}_2$ (I) START

(II) Br_2 $\frac{70.31\text{g Br}_2}{2\text{ l}} \left| \frac{1\text{ mole Br}_2}{160\text{g Br}_2} \right. = 0.22\text{ M Br}_2$ (I)

(E) $\frac{0.566\text{g H}_2}{2\text{ l}} \left| \frac{1\text{ mole H}_2}{2\text{g H}_2} \right. = 0.1415\text{ M H}_2$ (E)

Feb 14-7:46 AM

$H_2(g) + Br_2(g) \rightleftharpoons 2 HBr(g)$

[I] 0.3435	0.220	Q	
[Δ] -0.202	-0.202	+ 0.404	MOLE RATIO
[E] 0.1415	0.018	0.404	

$$K_{eq} = \frac{[HBr]^2}{[H_2][Br_2]} = \frac{(0.404)^2}{(0.1415)(0.018)} = 64.08$$
 K_{eq} Prod.
 Fav. Prod.

Feb 14-7:51 AM

Q vs. K

Q

NOT AT Equilibrium

K

Equilibrium

constant [Prod]^{coeff} / [React]^{coeff}

AT Equilib

Q > K → (Red arrow pointing left)

Q = K (Purple arrow pointing left)

Q < K → (Red arrow pointing right)

Feb 14-8:06 AM

p645
K_c = 50.5

$$\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2 \text{HI}(\text{g})$$

Q ⇒ 0.5 × 10⁻² M (H₂) | 1.5 × 10⁻² M (I₂) | 1 × 10⁻² M (HI)

time "t"

Q < K →

$$Q = \frac{[\text{HI}]^2}{[\text{H}_2][\text{I}_2]} = \frac{(1 \times 10^{-2})^2}{(0.5 \times 10^{-2})(1.5 \times 10^{-2})} = 1.33$$

(1.33)
Q

Feb 14-8:17 AM

The unknown!

K_c = 50.5

$$\text{H}_2(\text{g}) + \text{I}_2(\text{g}) \rightleftharpoons 2 \text{HI}(\text{g})$$

I	1	2	2
Δ	-x	-x	+2x
E	1-x	2-x	2x

x = 0.935

0.065 1.065 1.87

Make Ratio

$$K = \frac{[\text{HI}]^2}{[\text{H}_2][\text{I}_2]} = \frac{(2x)^2}{(1-x)(2-x)} = 50.5$$

ax² + bx + c = 0
Quadratic Formula

$$\frac{4x^2}{2 - 1x - 2x + x^2} = \frac{4x^2}{x^2 - 3x + 2} = 50.5$$

$$4x^2 = 50.5(x^2 - 3x + 2)$$

$$4x^2 = 50.5x^2 - 151.5x + 101$$

$$-4x^2 - 4x^2 + 151.5x - 101 = 0$$

$$46.5x^2 - 151.5x + 101 = 0$$

⊖ ⊖ ⊖

~~X₁ = 2.323~~ 1-x

X₂ = 0.935

No neg concentrations.

Feb 14-8:25 AM

15 / 37 a+b, 44

Feb 14-8:44 AM