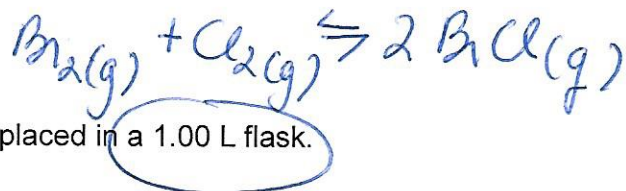


RICE Table Problems



1) 0.60 mol of bromine gas and 0.60 mol of chlorine are placed in a 1.00 L flask.

There is no BrCl at first.

After reaching equilibrium, the flask is found to contain 0.28 mol of BrCl.

What is the value of K for this reaction?

R	1 Br ₂	1 Cl ₂	⇌ 2 BrCl
I	0.60 mol / 1L	0.60 mol / 1L	∅
C	-0.14	-0.14	+0.28
E	0.46 mol / L	0.46 mol / L	0.28 mol / 1L

$$0.28 \text{ BrCl} \times \frac{1 \text{ mol Cl}_2}{2 \text{ mol BrCl}} = 0.14 \text{ mol Cl}_2$$

$$K_{eq} = \frac{[\text{BrCl}]^2}{[\text{Br}_2][\text{Cl}_2]} = \frac{(0.28)^2}{(0.46)(0.46)}$$

2)

Phosphorus pentachloride decomposes into Phosphorous trichloride and Chlorine gas. 0.500 moles of pure Phosphorus pentachloride is placed in a 2.00 L bottle.

What are the resulting concentrations?

R	PCl _{5(g)}	⇌ PCl _{3(g)}	+ Cl _{2(g)}	K _c = 0.0211	$[\text{PCl}_5] = \frac{0.500 \text{ mol}}{2.00 \text{ L}} = 0.250 \text{ M}$
I	0.250	∅	∅		
C	-x	+x	+x	1:1:1 mole ratio	
E	0.250 - x	x	x		

$$K_{eq} = \frac{[\text{PCl}_3][\text{Cl}_2]}{[\text{PCl}_5]} = \frac{(x)(x)}{(0.250-x)} = 0.0211$$

$$x^2 = 0.00528 - 0.0211x$$

$$x^2 + 0.0211x - 0.00528 = 0$$

a
b
c

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-0.0211 \pm \sqrt{(0.0211)^2 - 4(1)(0.00528)}}{2(1)}$$

$$= \frac{-0.0211 \pm \sqrt{0.000445 + 0.0211}}{2}$$

$$= \frac{-0.0211 \pm (0.147)}{2}$$

$$= 0.0630 \checkmark$$

$$X = 0.0841 \times$$

$$x = 0.0630 \frac{\text{mol}}{\text{L}}$$

Equilibrium concentrations

$$[\text{PCl}_5] = 0.250 - 0.0630 = 0.187 \frac{\text{mol}}{\text{L}}$$

$$[\text{PCl}_3] = 0.0630 \frac{\text{mol}}{\text{L}} = [\text{Cl}_2]$$