

# Calculating $K_{eq}$ Homework

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31)

444 # 31, 32

447 # 41, 42

451 # 51, 53

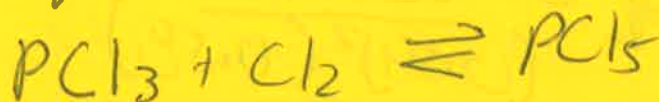


$$K_{eq} = \frac{[\text{N}_2][\text{H}_2]^3}{[\text{NH}_3]^2}$$

$$K_{eq} = \frac{(0.1)(0.3)^3}{(0.8)^2}$$

$$K_{eq} = 0.014$$

32)



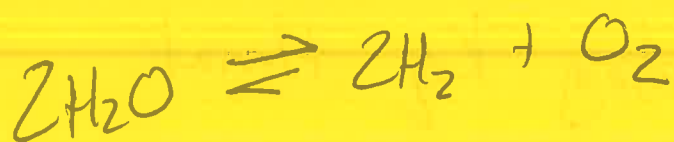
$$K_{eq} = \frac{[\text{PCl}_5]}{[\text{PCl}_3][\text{Cl}_2]}$$

$$[\text{PCl}_5] = (K_{eq})([\text{PCl}_3])([\text{Cl}_2])$$

$$[\text{PCl}_5] = (44)(0.035)(0.035)$$

$$[\text{PCl}_5] = 0.06M \text{ or mol/L}$$

41)



$$K_{eq} = \frac{[\text{H}_2]^2 [\text{O}_2]}{[\text{H}_2\text{O}]^2}$$

$$K_{eq} = \frac{(1.15)^2 (2.67)}{(0.63)^2}$$

$$K_{eq} = 8.89$$

42)



$$K_{eq} = \frac{[\text{SO}_3]^2}{[\text{SO}_2]^2 [\text{O}_2]}$$

$$K_{eq} = \frac{(2.67)^2}{(0.54)^2 (0.50)}$$

$$K_{eq} = 42.2$$

51)

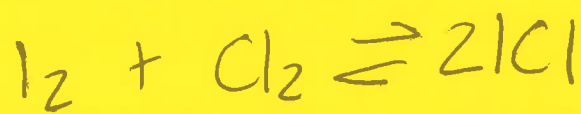


$$K_{eq} = \frac{[\text{HI}]^2}{[\text{H}_2] [\text{I}_2]}$$

$$K_{eq} = \frac{(3.4)^2}{(0.3) (1.3)}$$

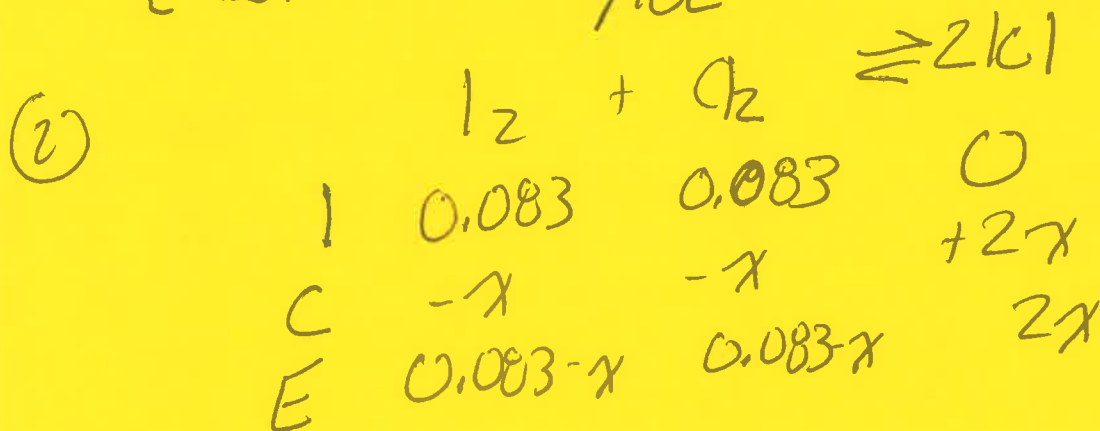
$$K_{eq} = 29.64$$

451 #53)



$$(1) [I_2]_i = 0.083 \text{ mol} / 10L = 0.083 \text{ M}$$

$$[Cl_2]_i = 0.083 \text{ mol} / 10L = 0.083 \text{ M}$$



$$(3) K_{eq} = \frac{[ICl]^2}{[I_2][Cl_2]}$$

$$82 = \frac{(2x)^2}{(0.083-x)^2} \rightarrow \sqrt{82} = \frac{\sqrt{(2x)^2}}{\sqrt{(0.083-x)^2}}$$

$$(\sqrt{82})(0.083-x) = (2x)$$

$$(\sqrt{82})(0.083) - \sqrt{82}x = 2x$$

$$(\sqrt{82})(0.083) = 2x + \sqrt{82}x$$

$$x = \frac{(\sqrt{82})(0.083)}{(2 + \sqrt{82})}$$

$$x = 0.068$$

$$(4) [I_2] = 0.083 - x = 0.083 - 0.068 = \underline{0.015 \text{ M}}$$

$$[Cl_2] = 0.083 - x = 0.083 - 0.068 = \underline{0.015 \text{ M}}$$

$$[ICl] = 2x = 2(0.068) = \underline{0.136 \text{ M}}$$

