

RICE Problems 2

+ no x or y initially

- 1) A student places 8.0 moles of A and 8.0 mol of B in a 2.0 L flask. When equilibrium is reached there are 4.0 moles of X.

Calculate the Keq of this reaction. (85.3 = Keq)

E line

$\Rightarrow [X] = \frac{4 \text{ mol}}{2 \text{ L}} = 2 \text{ M}$

$[A] = \frac{8 \text{ mol}}{2 \text{ L}} = 4 \text{ M}$

$[B] = \frac{8 \text{ mol}}{2 \text{ L}} = 4 \text{ M}$

R	A(g)	+ 2 B(g)	\leftrightarrow	2 X(g)	+ 4 Y(g)
I	4	4		\emptyset	\emptyset
C	-1	-2		+2	+4
E	3	2		2M	4

according to BCE

$$K_{eq} = \frac{[X]^2 [Y]^4}{[A] [B]^2} = \frac{(2)^2 (4)^4}{(3)(2)^2} = 85.3$$

- 2) For the reaction: $A(g) + B(g) \leftrightarrow C(g) + D(g)$ the Keq is 40.0.

0.20 M

The initial concentration for A was 0.15 mol/L and for B was 0.20 mol/L before reaction and no C or D was present.

What is the concentration of C at equilibrium? ([C] = 0.14 M)

R	A	+ B	\leftrightarrow	C	+ D
I	0.15	0.20		\emptyset	\emptyset
C	-x	-x		+x	+x
E	0.15 -x	0.20 -x		x	x

$$K_{eq} = \frac{[C][D]}{[A][B]}$$

$$40.0 = \frac{(x)(x)}{(0.15-x)(0.20-x)}$$

$$39x^2 - 14x + 1.2 = 0$$

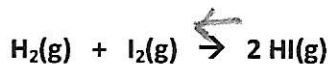
$$x = 0.22 \text{ or } 0.14 \text{ M} = x =$$

~~X~~
higher than the original concs!

\uparrow [C] + [D] at \rightleftharpoons

RICE Table Problems 2 cont.

3) For the reaction:



the equilibrium constant, K_{eq} , is 55

If the initial concentration of the hydrogen and iodine before reacting were both 0.1 mol/L and no HI was present, what is the hydrogen iodide concentration in mol/L at equilibrium?

R	H_2	+	I_2	\rightleftharpoons	2HI
					\emptyset
I	0.1		0.1		$+2x$
C	$-x$		$-x$		
E	$0.1-x$		$0.1-x$		$2x$

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

$$55 = \frac{(2x)^2}{(0.1-x)^2}$$

$$\sqrt{55} = \sqrt{\frac{(2x)^2}{(0.1-x)^2}}$$

$$7.4 = \frac{2x}{0.1-x}$$

$$(7.4)(0.1-x) = 2x$$

$$0.74 - 7.4x = 2x$$

$$0.74 = 9.4x$$

$$\frac{0.74}{9.4} = \frac{9.4x}{9.4}$$

$$x = 0.079 \frac{\text{mol}}{\text{L}}$$

$$[\text{HI}] = 2(0.079)$$

$$= 0.16 \frac{\text{mol}}{\text{L}}$$

4) For the reaction:



no RICE table needed because the \rightleftharpoons conc are given

the equilibrium concentration of A, B, C and D in mol/L are respectively $0.11 - x$, $0.11 - x$, and x and x . The equilibrium constant for the reaction is 100. What is the concentration for C in mol/L at equilibrium?

$$K_{eq} = \frac{[\text{C}][\text{D}]}{[\text{A}][\text{B}]} = \frac{(x)(x)}{(0.11-x)^2} = 100 \quad \sqrt{\frac{x^2}{(0.11-x)^2}} = \sqrt{100}$$

$$\frac{x}{0.11-x} = 10$$

$$x = 0.011 - 10x$$

$$\frac{11x}{11} = \frac{0.011}{11} = 0.0010 = x = [\text{C}] \frac{\text{mol}}{\text{L}}$$