+ no x or y initially

RICE Problems 2

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 ⇋ [X] = 4 mol / 2L = 2M

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

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

R	A(g)	+ 2 B(g)	↔ 2 X(g)	+ 4 Y(g)
I	4	4	∅	∅
C	−1	−2	+2	+4 according to BCE
E	3	2	2M	4

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

2) For the reaction: **A(g) + B(g) ↔ 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 020 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	⇋ C	+ D
I	0.15	0.20	∅	∅
C	−x	−x	+x	+x
E	0.15 − x	0.20 − x	x	x

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

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

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

$x = 0.22$ or $0.14M = x =$ [C] & [D] at ⇋

× higher than the original conc!

RICE Table Problems 2 cont.

3) For the reaction:

$$H_2(g) + I_2(g) \rightleftarrows 2\,HI(g)$$

the equilibrium constant, Keq, 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?

	H_2	+	I_2	⇌	$2HI$
R	N_2	+	I_2	⇌	$2HI$
I	0.1		0.1		∅
C	$-x$		$-x$		$+2x$
E	$0.1-x$		$0.1-x$		$2x$

$$K_{eq} = \frac{[HI]^2}{[H_2][I_2]}$$

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

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

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

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

$$0.74 - 7.4x = 2x$$

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

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

$$[HI] = 2(0.79) = 0.16 \frac{mol}{L}$$

4) For the reaction:

$$A(g) + B(g) \leftrightarrow C(g) + D(g)$$

no RICE table needed because the ⇌ conc are given

the equilibrium concentration of a 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?

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

$$\sqrt{\frac{x^2}{(0.11-x)^2}} = \sqrt{100}$$

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

$$x = 0.011 - 10x$$

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