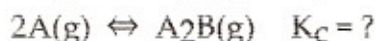
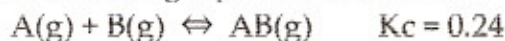


SHOW YOUR WORK FOR CREDIT / INCLUDE UNITS WHERE APPLICABLE

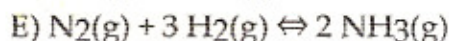
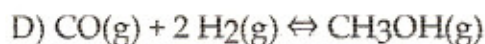
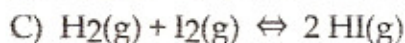
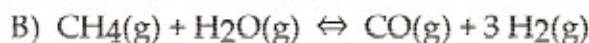
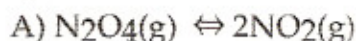
1) The equilibrium constant is given for two of the reactions below. Determine the value of the missing equilibrium constant.

MY ANSWER IS LETTER E

- A) 4.0 B) 0.63 C) 3.6 D) 16 E) 0.91

$$K_c = K_{c1} \times K_{c2} = 0.24 \times 3.8 = 0.91$$

2) In which of the following reactions will $K_c = K_p$? MY ANSWER IS LETTER C



3) Determine the value of K_c for the reaction: $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$, given these equilibrium concentrations: $[N_2]_{eq} = 1.5 \text{ M}$, $[H_2]_{eq} = 1.1 \text{ M}$, $[NH_3]_{eq} = 0.47 \text{ M}$.

- A) 3.5 B) 0.28 C) 0.11 D) 9.1 E) 0.78

MY ANSWER IS LETTER C

$$K_c = \frac{[NH_3]^2}{[N_2][H_2]^3} = \frac{.47^2}{1.5 \times 1.1^3} = 0.11$$

4) Determine the value of K_p for the reaction: $2CO(g) + O_2(g) \rightleftharpoons 2CO_2(g)$

if the equilibrium concentrations are as follows: $P(CO)_{eq} = 6.8 \times 10^{-11} \text{ atm}$,

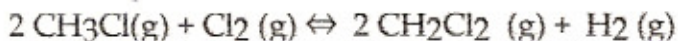
$P(O_2)_{eq} = 1.3 \times 10^{-3} \text{ atm}$, $P(CO_2)_{eq} = 0.041 \text{ atm}$.

- A) 3.6×10^{-21} B) 2.2×10^{-12} C) 4.6×10^{11} D) 2.8×10^{20} E) 3.6×10^{-15}

MY ANSWER IS LETTER D

$$K_p = \frac{P_{CO_2}^2}{P_{O_2} P_{CO}^2} = \frac{(0.041 \text{ atm})^2}{(1.3 \times 10^{-3} \text{ atm})(6.8 \times 10^{-11})^2} = 2.8 \times 10^{20}$$

5) Express the equilibrium constant for the reaction MY ANSWER IS LETTER E



A) $K = \frac{[\text{CH}_2\text{Cl}_2][\text{H}_2]}{[\text{CH}_3\text{Cl}][\text{Cl}_2]}$

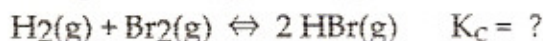
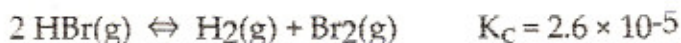
B) $K = \frac{[\text{CH}_3\text{Cl}]^2[\text{Cl}_2]}{[\text{CH}_2\text{Cl}_2]^2[\text{H}_2]}$

C) $K = \frac{[\text{CH}_3\text{Cl}]^2[\text{Cl}_2]}{[\text{CH}_2\text{Cl}_2][\text{H}_2]}$

D) $K = \frac{[\text{CH}_3\text{Cl}][\text{Cl}_2]}{[\text{CH}_2\text{Cl}_2][\text{H}_2]}$

E) $K = \frac{[\text{CH}_2\text{Cl}_2]^2[\text{H}_2]}{[\text{CH}_3\text{Cl}]^2[\text{Cl}_2]}$

6) The equilibrium constant is given for one of the reactions below. Determine the value of the missing equilibrium constant. MY ANSWER IS LETTER D



A) 1.9×10^4

B) 5.3×10^{-5}

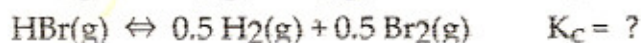
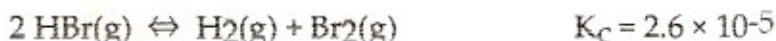
C) 6.4×10^{-4}

D) 3.8×10^4

E) 1.6×10^3

$$K_{c_{\text{rev}}} = \frac{1}{K_{c_{\text{for}}}} = \frac{1}{2.6 \times 10^{-5}} = 38461 = 3.8 \times 10^4$$

7) The equilibrium constant is given for one of the reactions below. Determine the value of the missing equilibrium constant. MY ANSWER IS LETTER C



A) 6.8×10^{-10}

B) 5.1×10^3

C) 5.1×10^{-3}

D) 6.8×10^{10}

E) 3.8×10^4

$$K_{c_{\text{new}}} = (K_{c_{\text{old}}})^{1/2} = (2.6 \times 10^{-5})^{1/2} = 5.1 \times 10^{-3}$$

8) The reaction $\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \rightleftharpoons 2 \text{NH}_3(\text{g})$ has a K_c value of 61. What is the value of K_p for this reaction at 226.85 C? MY ANSWER IS LETTER A

A) 3.6×10^{-2}

B) 61

C) 28

D) 15

E) 1.9×10^{-2}

$$K_p = K_c (RT)^{\Delta n}$$

$$\Delta n = 2 - 4 = -2$$

$$T = 500 \text{ K} = 273.15 + 226.85^\circ \text{C}$$

$$R = .08206 \text{ L atm / mol K}$$

$$K_p = 61 \left(.08206 \frac{\text{L atm}}{\text{mol K}} \times 500 \text{ K} \right)^{-2 \text{ mol}}$$

$$K_p = .036 = 3.6 \times 10^{-2}$$

9) Consider the reaction: $\text{Xe(g)} + 2\text{F}_2(\text{g}) \rightarrow \text{XeF}_4(\text{g})$. The reaction mixture initially contains 2.24 atm Xe and 4.27 atm F_2 . If the equilibrium pressure of Xe is 0.34 atm, by using an ICE table, find the equilibrium concentrations of all reactants and products and use them to find the equilibrium constant (K_p) for the reaction.

- A) 0.040 B) 0.12 C) 0.99 D) 8.3 E) 25

MY ANSWER IS LETTER

E

	Xe	$+ 2\text{F}_2$	\rightarrow	XeF_4	
I	2.24			0	atm
C	-1.90			+1.90	atm
E	0.34			1.90	atm

$$K_p = \frac{[\text{XeF}_4]}{[\text{Xe}][\text{F}_2]^2}$$

$$K_p = \frac{1.90}{0.34 \times 0.47^2} = 25$$

10) Consider the following reaction: $\text{CH}_4(\text{g}) + 2\text{H}_2\text{S}(\text{g}) \rightleftharpoons \text{CS}_2(\text{g}) + 4\text{H}_2(\text{g})$

The reaction mixture initially contains 0.50 M CH_4 and 0.75 M H_2S . If the equilibrium concentration of H_2 is 0.44 M, by using an ICE table, find the equilibrium concentrations of all reactants and products and use them to find the equilibrium constant (K_c) for the reaction.

- A) 0.038 B) 0.23 C) 2.9 D) 10. E) 0.34

MY ANSWER IS LETTER

A

	CH_4	$+ 2\text{H}_2\text{S}$	\rightarrow	CS_2	$+ 4\text{H}_2$	
I	0.5			0	0	M
C	-0.11			+0.11	+0.44	M
E	0.39			0.11	0.44	M

$$K_c = \frac{0.11 \times 0.44^4}{0.39 \times 0.53^2} = 0.038$$

$$K_c = \frac{[\text{CS}_2][\text{H}_2]^4}{[\text{CH}_4][\text{H}_2\text{S}]^2}$$