Gen Chem II Lecture Spring 20 Dr. Hahn A section Quiz 6 3/6 Friday Exam # ________

Name ______Key______ Print Name ________________

Please show work on all questions for partial credit even on questions which do not specify. (20 total pts)
(1 pt each multiple choice question)

1. Which one of the following statements does not describe the equilibrium state ?
   (A) Equilibrium is dynamic and there is no net conversion to reactants and products.
   (B) The rate of the forward reaction is equal to the rate of the reverse reaction.
   (C) The concentration of the reactants and products reach a constant level.
   (D) The concentration of the reactants is equal to the concentration of the products.

$n = 3 - 1 = 2$

2. K_p is relate to K_c by the equation $K_p = K_c(RT)^{n}$. What is the value of n for the reaction below ?

$NH_4NO_3(s) \rightarrow N_2O\ (g) + 2H_2O(g)$ (A) +1 (B) +2 (C) -2 (D) -1

3. Write the equilibrium equation for the **forward** rxn: $2CH_4(g) + 3\ O_2(g) \rightarrow 2\ CO\ (g) + 4\ H_2O\ (g)$

(A) $K_p = \frac{[P_{CO}]^2 [P_{H2O}]^4}{[P_{CH4}]^2 [P_{O2}]^3}$ (B) $K_p = \frac{2[P_{CH4}]+3[P_{O2}]}{2[P_{CO}]+4[P_{H2O}]}$ (C) $K_p = \frac{[P_{CH4}]^2[P_{O2}]^3}{[P_{CO}]^2[P_{H2O}]^4}$ (D) $K_p = \frac{2[P_{CO}] + 4[P_{H2O}]}{2[P_{CH4}]+3[P_{O2}]}$

4. If K_c equals 0.110 at 25°C for the reaction : $N_2O_4(g) \rightarrow 2\ NO_2\ (g)$, what is the K_c for the reaction:

$6NO_2\ (g) \rightarrow 3N_2O_4\ (g)$? $\left(\frac{1}{0.110}\right)^3$ (A) 0.11 (B) 751 (C) 7.5 (D) 1.3×10^{-3}

5. Iron oxide ores are reduced to Fe metal by exothermic rxn with CO: $FeO(s) + CO(g) \rightarrow Fe\ (s) + CO_2\ (g)$

Which of the following changes in condition will cause the equilibrium to shift to the right ?
   (A) Add CO_2 (B) add CO (C) add Fe (s) (D) remove FeO

SA1: Cyclohexane (C_6H_{12}) undergoes a molecular rearrangement in the presence of $AlCl_3$ to form methylcylcopentane ($CH_3C_5H_9$) according to the equation: $C_6H_{12} \rightarrow CH_3\ C_5H_9$

$K_c = 0.143$ (Rxn goes ←)

If $K_c = 0.143$ at 25°C for this reaction. C_6H_{12} initial concentration is 0.200 M and $CH_3C_5H_9$ initial concentration is 0.100 M. Set up the ICE table and show the expression for K_c. Assume that the variable x is the amount of C_6H_{12} being formed. (8 pts)

	C_6H_{12}	$CH_3C_5H_9$
i	0.200	0.100
c	+x	−x
e	0.200+x	0.100−x

5 pt

$K_c \overset{2pt}{=} \frac{(0.100-x)}{(0.200+x)} = 0.143$ plug in 1pt

end of answer to question

$(0.100-x) = (0.143)(0.200) + 0.143x$

$0.100 - 0.0286 = 1x + 0.143x$

$0.0714 = 1.143x$

$x = \frac{0.0714}{1.143} =$

$x = 0.06$

SA2: Consider the reaction $HCO_3^-(aq) + H_2O(l) \rightarrow CO_3^{-2}\ (aq) + H_3O^+\ (aq)$

The K_{eq} for this reaction is 5.6×10^{-11}. Calculate the value of Q. Does the reaction go forward to product or backward to reactant ? $[HCO_3^-] = 5.6 \times 10^{-11}$ $[H_3O^+] = 1.2 \times 10^{-11}$ $[CO_3^{-2}] = 5.6 \times 10^{-11}$ (7 pts)

$Q = \frac{(5.6 \times 10^{-11})(1.2 \times 10^{-11})}{(5.6 \times 10^{-11})} = 1.2 \times 10^{-11}$

$Q < 5.6 \times 10^{-11}$ K

5pts

2pt forward Rxn →

Gen Chem II Lecture Spring 20 Dr. Hahn C section Form A Quiz 6 3/6 Friday Exam # ________

Name ________Key________ Print Name ______________________

Please show work on all questions for partial credit even on questions which do not specify. (20 total pts) (1 pt each multiple choice)

1. Write the equation for the **reverse** reaction : $2CH_4(g) + 3\,O_2(g) \rightleftarrows 2\,CO\,(g) + 4\,H_2O\,(g)$

(A) ~~Kp~~ $= \dfrac{[P_{CO}]^2\,[P_{H2O}]^4}{[P_{CH4}]^2\,[P_{O2}]^3}$ (B) $Kp = \dfrac{2[P_{CH4}]+3[P_{O2}]}{2[P_{CO}]+4[P_{H2O}]}$ (C) $Kp = \dfrac{[P_{CH4}]^2[P_{O2}]^3}{[P_{CO}]^2[P_{H2O}]^4}$ (D) $Kp = \dfrac{2[P_{CO}] + 4[P_{H2O}]}{2[P_{CH4}]+3[P_{O2}]}$

2. What is true about the relationship of Kp and Kc for the rxn: $2CH_4(g) + 3\,O_2(g) \rightleftarrows 2\,CO\,(g) + 4\,H_2O\,(g)$

typo

(A) Kp < Kc (B) Kp> Kc (C) Kp = Kc (D) Kp and Kc are not related $\Delta n = 6 - 5 = +1$

3 What is the equilibrium equation for the following rxn ? $C_2H_4\,(g) + 3O_2(g) \rightleftarrows 2CO_2\,(g) + 2\,H_2O\,(l)$

(A) $Kp = \dfrac{[P_{CO2}]^2\,[P_{H2O}]^2}{[P_{C2H4}]\,[P_{O2}]^3}$ (B) $Kp = \dfrac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^2}$ (C) $Kp = \dfrac{[P_{CO2}]^2}{[P_{C2H4}][P_{O2}]^3}$ (D) $Kp = \dfrac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^3[P_{H2O}]^2}$

4. If K_c equals 0.110 at 25°C for the reaction : $N_2O_4(g) \rightleftarrows 2\,NO_2\,(g)$, what is the K_c for the reaction:

(A) $6NO_2\,(g) \rightleftarrows 3N_2O_4\,(g)$? (A) 0.11 (B) 751 (C) 7.5 (D) 1.3×10^{-3}

$\left(\dfrac{1}{0.110}\right)^3 = 751$

5. Which statement is true for a reaction with $K_c = 8.90 \times 10^{-12}$

(A) The reaction proceeds hardly at all towards completion. (B) The reaction proceeds nearly all the way to completion (C) Increasing the temperature will not change the value of K_c (D) There are appreciable concentrations of both reactants and products

SA #1: Given the following reaction: $PCl_5\,(g) \rightleftarrows PCl_3\,(g) + Cl_2\,(g)$

Rxn goes →

At 250° C 0.250 M PCl_5 is added to the flask. None of the product is present initially. $K_c = 1.80$ Show the ICE table and the expression for the K_c. (8 pts)

	PCl_5	PCl_3	Cl_2
i	0.250	0	0
c	−x	+x	+x
e	0.250−x	x	x

5pt

$K_c = \dfrac{[PCl_3][Cl_2]}{[PCl_5]g}$ 2pts

$K_c = \dfrac{(x)(x)}{(0.250-x)} = 1.80$ 1pt

end of answer to question

SA #2: The decomposition of ammonia is $2NH_3\,(g) \rightleftarrows N_2(g) + 3\,H_2(g)$. If the partial pressure of ammonia is 1.60×10^{-3} atm and the partial pressure of N_2 and H_2 are each 0.250 atm at equilibrium, what is the value for K_p at 400°C for the forward reaction ? What is the number for Δ n for the reaction? $Kp = Kc\,(RT)^{\Delta n}$ (7 pts)

$K_p = \dfrac{(P_{N_2})(P_{H_2})^3}{(P_{NH_3})^2} = \dfrac{(0.250\,atm)(0.250)^3}{(1.60 \times 10^{-3})^2} = 1526$

1.53×10^3

BA −2½ 5pt

$\Delta n = 4 - 2 = 2$

2pt

Gen Chem II Lecture Spring 20 Dr. Hahn C section Form B Quiz 6 3/6 Friday Exam # ________

Name ____Key____ Print Name ________________

Please show work on all questions for partial credit even on questions which do not specify. (20 total pts)
(1 pt each multiple choice)

1. Write the equation for the **reverse** reaction : $2CH_4(g) + 3\ O_2(g) \rightleftarrows 2\ CO\ (g) + 4\ H_2O\ (g)$

(A) $K_p = \frac{2[P_{CH4}]+3[P_{O2}]}{2[P_{CO}]+4[P_{H2O}]}$ (B) $K_p = \frac{[P_{CO}]^2[P_{H2O}]^4}{[P_{CH4}]^2[P_{O2}]^3}$ (C) $K_p = \frac{[P_{CH4}]^2[P_{O2}]^3}{[P_{CO}]^2[P_{H2O}]^4}$ (D) $K_p = \frac{2[P_{CO}]+4[P_{H2O}]}{2[P_{CH4}]+3[P_{O2}]}$

2. What is true about the relationship of Kp and Kc for the rxn: $2CH_4(g) + 3\ O_2(g) \rightleftarrows 2\ CO\ (g) + 4\ H_2O\ (g)$

(A) Kp , Kc < typo (B) Kp and Kc are not related (C) Kp> Kc (D) Kp = Kc

$\Delta n = (4+2) - (2+3)$

$\Delta n = 1$

3 What is the equilibrium equation for the following rxn ? $C_2H_4\ (g) + 3O_2(g) \rightleftarrows 2CO_2\ (g) + 2\ H_2O\ (l)$

(A) $K_p = \frac{[P_{CO2}]^2}{[P_{C2H4}][P_{O2}]^3}$ (B) $K_p = \frac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^2}$ (C) $K_p = \frac{[P_{CO2}]^2[P_{H2O}]^2}{[P_{C2H4}][P_{O2}]^3}$ (D) $K_p = \frac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^3[P_{H2O}]^2}$

4. If K_c equals 0.110 at 25°C for the reaction : $N_2O_4(g) \rightleftarrows 2\ NO_2\ (g)$, what is the K_c for the reaction:

$6NO_2\ (g) \rightleftarrows 3N_2O_4\ (g)$? (A) 7.5 (B) 1.3×10^{-3} (C) 0.11 (D) 751

$\left(\frac{1}{K_c}\right)^3 = (9.09)^3 = 751$

5. Which statement is true for a reaction with $K_c = 8.90 \times 10^{-12}$

(A) The reaction proceeds nearly all the way to completion (B) The reaction proceeds hardly at all towards completion. (C) Increasing the temperature will not change the value of K_c (D) There are appreciable concentrations of both reactants and products

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ for T3

probably will not need

SA #1: Given the following reaction: $PCl_5\ (g) \rightleftarrows PCl_3\ (g) + Cl_2\ (g)$

At 250° C 0.150 M PCl_5 is added to the flask. None of the product is present initially. ~~K_c = 4.20 Show the ICE table~~ and the expression for the K_c. (8 pts)

	PCl_5	PCl_3	Cl_2
i	0.150	0	0
c	−x	+x	+x
e	0.150−x	x	x

5pt

answer to question $4.20 = \frac{(x)(x)}{(0.150-x)}$ 2pt

$x^2 + 4.20x - 0.63 = 0$

$(4.20)(0.150-x) = x^2$

$0.63 - 4.20x = x^2$

$x = \frac{-4.20 \pm \sqrt{4.20^2 - 4(1)(-0.63)}}{2(1)}$

$x = 0.145$

SA #2: The decomposition of ammonia is $2NH_3\ (g) \rightarrow N_2(g) + 3\ H_2(g)$. If the partial pressure of ammonia is 2.60×10^{-5} atm and the partial pressure of N_2 and H_2 are each 0.520 atm at equilibrium, what is the value for K_p at 400°C for the forward reaction ? What is the number for Δ n for the reaction? $K_p = K_c\ (RT)^{\Delta n}$ (7 pts)

$K_p = \frac{(P_{N_2})(P_{H_2})^3}{(P_{NH_3})^2} = \frac{(0.520)(0.520)^3}{(2.60 \times 10^{-5})^2} = \frac{0.0731}{6.76 \times 10^{-10}} = 1.08 \times 10^8$ 5pt

$\Delta n = (1+3) - 2 = 2$ 2pt

BA − 2 ½

Gen Chem II Lecture Spring 20 Dr. Hahn Makeup Quiz Quiz 6 3/6 Friday Exam # ________

Name Key ______________________ Print Name ______________________

Please show work on all questions for partial credit even on questions which do not specify. (20 total pts)
(1 pt each multiple choice)

1. Write the equation for the **reverse** reaction : $2CH_4(g) + 3\,O_2(g) \rightleftarrows 2\,CO\,(g) + 4\,H_2O\,(l)$

(A) $K_p = \frac{2[P_{CH4}]+3[P_{O2}]}{2[P_{CO}]+4[P_{H2O}]}$ (B) $K_p = \frac{[P_{CO}]^2\,[P_{H2O}]^4}{[P_{CH4}]^2\,[P_{O2}]^3}$ (C) $K_p = \frac{[P_{CH4}]^2[P_{O2}]^3}{[P_{CO}]^2}$ (D) $K_p = \frac{2[P_{CO}] + 4[P_{H2O}]}{2[P_{CH4}]+3[P_{O2}]}$

2. What is true about the relationship of Kp and Kc for the rxn: $2CH_4(g) + 3\,O_2(g) \rightleftarrows 2\,CO\,(g) + 4\,H_2O\,(g)$

(A) Kp> Kc (B) Kp and Kc are not related (C) Kp < Kc (D) Kp = Kc $\Delta n = 6 - 5 = 1$

3 What is the equilibrium equation for the following rxn ? $C_2H_4\,(g) + 3O_2(g) \rightleftarrows 2CO_2\,(g) + 2\,H_2O\,(g)$

(A) $K_p = \frac{[P_{CO2}]^2}{[P_{C2H4}]\,[P_{O2}]^3}$ (B) $K_p = \frac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^2}$ (C) $K_p = \frac{[P_{CO2}]^2\,[P_{H2O}]^2}{[P_{C2H4}][P_{O2}]^3}$ (D) $K_p = \frac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^3[P_{H2O}]^2}$

4. If K_c equals 0.110 at 25°C for the reaction : $N_2O_4(g) \rightleftarrows 2\,NO_2\,(g)$, what is the K_c for the reaction:

×2

(A) $4\,NO_2\,(g) \rightleftarrows 2N_2O_4\,(g)$? (A) 82.6 (B) 1.3×10^{-3} (C) 0.11 (D) 751 $\left(\frac{1}{0.110}\right)^2 = 82.6$

5. Which statement is true for a reaction with $K_c = 8.90 \times 10^{-12}$

(A) The reaction proceeds nearly all the way to completion (B) The reaction proceeds hardly at all towards completion. (C) Increasing the temperature will not change the value of K_c (D) There are appreciable concentrations of both reactants and products

SA #1: Given the following reaction: $PCl_3\,(g) + Cl_2\,(g) \rightleftarrows PCl_5\,(g)$

At 250° C 0.150 M PCl_3, 0.210 M Cl_2 is added to the flask. None of the product is present initially. $K_c = 4.20$ Show the ICE table and the expression for the K_c. (8 pts)

	PCl_3	Cl_2	PCl_5
I	0.150	0.210	0
C	−x	−x	+x
E	0.150−x	0.210−x	x

5pt

$K_c = \frac{PCl_5}{(P_{Cl_3})(P_{Cl_2})}$ 2pt

$K = \frac{x}{(0.150-x)(0.210-x)}$ 1pt

SA #2: The decomposition of ammonia is $2NH_3\,(g) \rightarrow N_2(g) + 3\,H_2(g)$. If the partial pressure of ammonia is 2.60×10^{-5} atm and the partial pressure of N_2 is 0.359 atm and H_2 are 0.723 atm at equilibrium, what is the value for K_p at 400°C for the forward reaction ? What is the number for Δ n for the reaction? $K_p = K_c\,(RT)^{\Delta n}$ (7 pts)

$K_p = \frac{(N_2)(H_2)^3}{(NH_3)^2} = \frac{(0.359\,atm)(0.723)^3}{(2.60 \times 10^{-5})^2} = \frac{0.1357}{6.76 \times 10^{-10}}$ 5pt

0.378

$= 2.01 \times 10^{8}$

$\Delta n = (1+3) - 2 = 2$ 2pt

Gen Chem II Lecture Spring 20 Dr. Hahn A section Quiz 6 3/6 Friday Exam # ________

Name ______________________________________ Print Name ___________________________________

Please show work on all questions for partial credit even on questions which do not specify. (20 total pts)
(1 pt each multiple choice question)

1. Which one of the following statements does not describe the equilibrium state ?
   (A) Equilibrium is dynamic and there is no net conversion to reactants and products.
   (B) The rate of the forward reaction is equal to the rate of the reverse reaction.
   (C) The concentration of the reactants and products reach a constant level.
   (D) The concentration of the reactants is equal to the concentration of the products.

2. K_p is relate to K_c by the equation $K_p = K_c(RT)^n$. What is the value of n for the reaction below ?

$NH_4NO_3(s) \rightarrow N_2O\,(g) + 2H_2O(g)$ (A) +1 (B) +2 (C) -2 (D) -1

3. Write the equilibrium equation for the **forward** rxn: $2CH_4(g) + 3\,O_2(g) \rightleftarrows 2\,CO\,(g) + 4\,H_2O\,(g)$

(A) $Kp = \dfrac{[P_{CO}]^2\,[P_{H2O}]^4}{[P_{CH4}]^2\,[P_{O2}]^3}$ (B) $Kp = \dfrac{2[P_{CH4}]+3[P_{O2}]}{2[P_{CO}]+4[P_{H2O}]}$ (C) $Kp = \dfrac{[P_{CH4}]^2[P_{O2}]^3}{[P_{CO}]^2[P_{H2O}]^4}$ (D) $Kp = \dfrac{2[P_{CO}] + 4[P_{H2O}]}{2[P_{CH4}]+3[P_{O2}]}$

4. If K_c equals 0.110 at 25°C for the reaction : $N_2O_4(g) \rightleftarrows 2\,NO_2\,(g)$, what is the K_c for the reaction:

$6NO_2\,(g) \rightarrow 3N_2O_4\,(g)$? (A) 0.11 (B) 751 (C) 7.5 (D) 1.3×10^{-3}

5. Iron oxide ores are reduced to Fe metal by exothermic rxn with CO: $FeO(s) + CO(g) \rightleftarrows Fe\,(s) + CO_2\,(g)$

Which of the following changes in condition will cause the equilibrium to shift to the right ?
   (A) Add CO_2 (B) add CO (C) add Fe (s) (D) remove FeO

SA1: Cyclohexane (C_6H_{12}) undergoes a molecular rearrangement in the presence of $AlCl_3$ to form methylcylcopentane ($CH_3C_5H_9$) according to the equation: $C_6H_{12} \rightleftarrows CH_3\,C_5H_9$

If K_c = 0.143 at 25°C for this reaction. C_6H_{12} initial concentration is 0.200 M and $CH_3C_5H_9$ initial concentration is 0.100 M. Set up the ICE table and show the expression for K_c. Assume that the variable *x* is the amount of C_6H_{12} being formed. (8 pts)

SA2: Consider the reaction $HCO_3^-(aq) + H_2O(l) \rightarrow CO_3^{-2}\,(aq) + H_3O^+\,(aq)$
The K_{eq} for this reaction is 5.6×10^{-11}. Calculate the value of Q. Does the reaction go forward to product or backward to reactant ? $[HCO_3^-] = 5.6 \times 10^{-11}$ $[H_3O^+] = 1.2 \times 10^{-11}$ $[CO_3^-] = 5.6 \times 10^{-11}$ (7 pts)

Gen Chem II Lecture Spring 20 Dr. Hahn C section Form A Quiz 6 3/6 Friday Exam # ________

Name ____ Print Name ____________________________________

Please show work on all questions for partial credit even on questions which do not specify. (20 total pts) (1 pt each multiple choice)

6. Write the equation for the **reverse** reaction : $2CH_4(g) + 3\,O_2(g) \rightleftarrows 2\,CO\,(g) + 4\,H_2O\,(g)$

(A) $K_p = \dfrac{[P_{CO}]^2\,[P_{H2O}]^4}{[P_{CH4}]^2\,[P_{O2}]^3}$ (B) $K_p = \dfrac{2[P_{CH4}]+3[P_{O2}]}{2[P_{CO}]+4[P_{H2O}]}$ (C) $K_p = \dfrac{[P_{CH4}]^2[P_{O2}]^3}{[P_{CO}]^2[P_{H2O}]^4}$ (D) $K_p = \dfrac{2[P_{CO}] + 4[P_{H2O}]}{2[P_{CH4}]+3[P_{O2}]}$

2. What is true about the relationship of Kp and Kc for the rxn: $2CH_4(g) + 3\,O_2(g) \rightleftarrows 2\,CO\,(g) + 4\,H_2O\,(g)$

(A) Kp , Kc (B) Kp> Kc (C) Kp = Kc (D) Kp and Kc are not related

3 What is the equilibrium equation for the following rxn ? $C_2H_4\,(g) + 3O_2(g) \rightleftarrows 2CO_2\,(g) + 2\,H_2O\,(l)$

(A) $K_p = \dfrac{[P_{CO2}]^2\,[P_{H2O}]^2}{[P_{C2H4}]\,[P_{O2}]^3}$ (B) $K_p = \dfrac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^2}$ (C) $K_p = \dfrac{[P_{CO2}]^2}{[P_{C2H4}][P_{O2}]^3}$ (D) $K_p = \dfrac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^3[P_{H2O}]^2}$

4. If K_c equals 0.110 at 25°C for the reaction : $N_2O_4(g) \rightleftarrows 2\,NO_2\,(g)$, what is the K_c for the reaction:

(A) $6NO_2\,(g) \rightleftarrows 3N_2O_4\,(g)$? (A) 0.11 (B) 751 (C) 7.5 (D) 1.3×10^{-3}

5. Which statement is true for a reaction with $K_c = 8.90 \times 10^{-12}$

(A) The reaction proceeds hardly at all towards completion. (B) The reaction proceeds nearly all the way to completion (C) Increasing the temperature will not change the value of K_c (D) There are appreciable concentrations of both reactants and products

SA #1: Given the following reaction: $PCl_5\,(g) \rightleftarrows PCl_3\,(g) + Cl_2\,(g)$

At 250° C 0.250 M PCl_5 is added to the flask. None of the product is present initially. $K_c = 1.80$ Show the ICE table and the expression for the K_c. (8 pts)

SA #2: The decomposition of ammonia is $2NH_3\,(g) \rightarrow N_2(g) + 3\,H_2(g)$. If the partial pressure of ammonia is 1.60×10^{-3} atm and the partial pressure of N_2 and H_2 are each 0.250 atm at equilibrium, what is the value for K_p at 400°C for the forward reaction ? What is the number for Δ n for the reaction? $K_p = K_c\,(RT)^{\Delta n}$ (7 pts)

Gen Chem II Lecture Spring 20 Dr. Hahn C section Form B Quiz 6 3/6 Friday Exam # ________

Name ____ Print Name ____________________________________

Please show work on all questions for partial credit even on questions which do not specify. (20 total pts) (1 pt each multiple choice)

7. Write the equation for the **reverse** reaction : $2CH_4(g) + 3\,O_2(g) \rightleftarrows 2\,CO\,(g) + 4\,H_2O\,(g)$

(A) $K_p = \frac{2[P_{CH4}]+3[P_{O2}]}{2[P_{CO}]+4[P_{H2O}]}$ (B) $K_p = \frac{[P_{CO}]^2\,[P_{H2O}]^4}{[P_{CH4}]^2\,[P_{O2}]^3}$ (C) $K_p = \frac{[P_{CH4}]^2[P_{O2}]^3}{[P_{CO}]^2[P_{H2O}]^4}$ (D) $K_p = \frac{2[P_{CO}] + 4[P_{H2O}]}{2[P_{CH4}]+3[P_{O2}]}$

2. What is true about the relationship of Kp and Kc for the rxn: $2CH_4(g) + 3\,O_2(g) \rightleftarrows 2\,CO\,(g) + 4\,H_2O\,(g)$

(B) Kp , Kc (B) Kp and Kc are not related (C) Kp> Kc (D) Kp = Kc

3 What is the equilibrium equation for the following rxn ? $C_2H_4\,(g) + 3O_2(g) \rightleftarrows 2CO_2\,(g) + 2\,H_2O\,(l)$

(A) $K_p = \frac{[P_{CO2}]^2}{[P_{C2H4}]\,[P_{O2}]^3}$ (B) $K_p = \frac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^2}$ (C) $K_p = \frac{[P_{CO2}]^2\,[P_{H2O}]^2}{[P_{C2H4}][P_{O2}]^3}$ (D) $K_p = \frac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^3[P_{H2O}]^2}$

5. If K_c equals 0.110 at 25°C for the reaction : $N_2O_4(g) \rightleftarrows 2\,NO_2\,(g)$, what is the K_c for the reaction:

(B) $6NO_2\,(g) \rightleftarrows 3N_2O_4\,(g)$? (A) 7.5 (B) 1.3×10^{-3} (C) 0.11 (D) 751

6. Which statement is true for a reaction with $K_c = 8.90 \times 10^{-12}$

(B) The reaction proceeds nearly all the way to completion (B) The reaction proceeds hardly at all towards completion. (C) Increasing the temperature will not change the value of K_c (D) There are appreciable concentrations of both reactants and products

SA #1: Given the following reaction: $PCl_5\,(g) \rightleftarrows PCl_3\,(g) + Cl_2\,(g)$

At 250° C 0.150 M PCl_5 is added to the flask. None of the product is present initially. $K_c = 4.20$ Show the ICE table and the expression for the K_c. (8 pts)

SA #2: The decomposition of ammonia is $2NH_3\,(g) \rightarrow N_2(g) + 3\,H_2(g)$. If the partial pressure of ammonia is 2.60×10^{-5} atm and the partial pressure of N_2 and H_2 are each 0.520 atm at equilibrium, what is the value for K_p at 400°C for the forward reaction ? What is the number for Δ n for the reaction? $K_p = K_c\,(RT)^{\Delta n}$ (7 pts)

Gen Chem II Lecture Spring 20 Dr. Hahn Makeup Quiz Quiz 6 3/6 Friday Exam # ________

Name ____ Print Name ____________________________________

Please show work on all questions for partial credit even on questions which do not specify. (20 total pts) (1 pt each multiple choice)

8. Write the equation for the **reverse** reaction : $2CH_4(g) + 3\ O_2(g) \rightleftharpoons 2\ CO\ (g) + 4\ H_2O\ (l)$

(A) $K_p = \frac{2[P_{CH4}]+3[P_{O2}]}{2[P_{CO}]+4[P_{H2O}]}$ (B) $K_p = \frac{[P_{CO}]^2\ [P_{H2O}]^4}{[P_{CH4}]^2\ [P_{O2}]^3}$ (C) $K_p = \frac{[P_{CH4}]^2[P_{O2}]^3}{[P_{CO}]^2}$ (D) $K_p = \frac{2[P_{CO}] + 4[P_{H2O}]}{2[P_{CH4}]+3[P_{O2}]}$

2. What is true about the relationship of Kp and Kc for the rxn: $2CH_4(g) + 3\ O_2(g) \rightleftharpoons 2\ CO\ (g) + 4\ H_2O\ (g)$

(C) Kp> Kc (B) Kp and Kc are not related (C) Kp < Kc (D) Kp = Kc

3 What is the equilibrium equation for the following rxn ? $C_2H_4\ (g) + 3O_2(g) \rightleftharpoons 2CO_2\ (g) + 2\ H_2O\ (g)$

(A) $K_p = \frac{[P_{CO2}]^2}{[P_{C2H4}]\ [P_{O2}]^3}$ (B) $K_p = \frac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^2}$ (C) $K_p = \frac{[P_{CO2}]^2\ [P_{H2O}]^2}{[P_{C2H4}][P_{O2}]^3}$ (D) $K_p = \frac{[P_{C2H4}][P_{O2}]^3}{[P_{CO2}]^3[P_{H2O}]^2}$

6. If K_c equals 0.110 at 25°C for the reaction : $N_2O_4(g) \rightleftharpoons 2\ NO_2\ (g)$, what is the K_c for the reaction:

(C) $4\ NO_2\ (g) \rightleftharpoons 2N_2O_4\ (g)$? (A) 82.6 (B) 1.3×10^{-3} (C) 0.11 (D) 751

7. Which statement is true for a reaction with $K_c = 8.90 \times 10^{-12}$

(C) The reaction proceeds nearly all the way to completion (B) The reaction proceeds hardly at all towards completion. (C) Increasing the temperature will not change the value of K_c (D) There are appreciable concentrations of both reactants and products

SA #1: Given the following reaction: $PCl_3\ (g) + Cl_2\ (g) \rightleftharpoons PCl_5\ (g)$

At 250° C 0.150 M PCl_3, 0.210 M Cl_2 is added to the flask. None of the product is present initially. $K_c = 4.20$ Show the ICE table and the expression for the K_c. (8 pts)

SA #2: The decomposition of ammonia is $2NH_3\ (g) \rightarrow N_2(g) + 3\ H_2(g)$. If the partial pressure of ammonia is 2.60×10^{-5} atm and the partial pressure of N_2 is 0.359 atm and H_2 are 0.723 atm at equilibrium, what is the value for K_p at 400°C for the forward reaction ? What is the number for Δ n for the reaction? $K_p = K_c\ (RT)^{\Delta n}$ (7 pts)