Chemistry 141 Name

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Quiz 9 (20 points) December 4, 2008

All work must be shown to receive credit.

=iMRT, Tb=*imkb,* Tf=*imkf*

R=0.0821 L atm/mol K = 62.4 L torr/mol K = 8.31 J/mol K

1. (8 points) An aqueous solution of a certain organic compound by dissolving 3.296 g of the compound in water and diluting it to a total volume of 20.00 mL. The osmotic pressure of the solution is 12.16 atm at 25.0oC. What is the molar mass of the compound?

$$Molar mass=\frac{g unknown}{mol unknown}=\frac{3.296 g}{20.00 mL}×\frac{1000 mL}{0.4970 mol}=331.5 g/mol$$

$$M=\frac{π}{RT}=\frac{\left(12.16 atm\right) mol K}{\left(0.0821 L atm\right)\left(298 K\right)}=0.4970 M$$

1. (4 points) Write an equilibrium expression for the following reactions
	1. Fe2O3(s) + 3 CO(g) ↔ 2 Fe(l) + 3 CO2(g)

 $Kc=\frac{[CO\_{2}]^{3}}{[CO]^{3}}$

* 1. 4 Fe(s) + 3 O2(g) ↔ 2 Fe2O3(s)

 $Kp=\frac{1}{[O\_{2}]^{3}}$

1. (8 points) A sample of HI (9.30 x 10-3mol) was placed in an empty 2.00 L container at 1000K. After equilibrium was reached, the concentration of I2 was 6.29 x 10-4 M. Calculate the value of Kc at 1000K for the reaction H2(g) + I2(g) ↔2 HI(g).

[HI]initial = 9.30 x 10-3mol/2.00 L = 4.65 x 10-3M

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | H2(g) | + | I2(g) | ↔ | 2 HI(g) |
| I | 0 M |  | 0 M |  | 4.65 x 10-3M |
|  | +x |  | +x |  | -2x |
| E | X2.01 x 10-3 M |  | X=2.01 x 10-3 M |  | 4.65 x 10-3M – 2x= 6.29 x 10-4 MX = 2.01 x 10-3 M |

$$Kc=\frac{\left[HI\right]^{2}}{\left[H\_{2}\right]\left[I\_{2}\right]}=\frac{\left(6.29×10^{-4}M\right)^{2}}{\left(2.01×10^{-3}M\right)^{2}}=0.098$$