

Name \_\_\_\_\_ KEY \_\_\_\_\_ Section \_\_\_\_\_ chm152 Quiz 5

1) (2 pts) The expressions below represent the equilibrium concentrations for a given reaction. The quadratic formula was used in solving this problem. What are the equilibrium concentrations for all reactants and products?

$$[A] = (0.587 - X)$$

$$[B] = (0.698 - X)$$

$$[C] = 2X$$

Results from Quadratic Formula

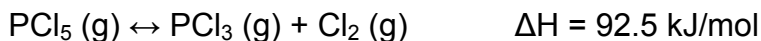
$$X = 0.675 \quad \text{and} \quad X = 0.472$$

$$[A] = (0.587 - X) = 0.587 - 0.472 = \mathbf{0.115 \text{ M}}$$

$$[B] = (0.698 - X) = 0.698 - 0.472 = \mathbf{0.226 \text{ M}}$$

$$[C] = 2X = 2 \cdot 0.472 = \mathbf{0.944 \text{ M}}$$

2) (3 pts) For the reaction shown below, which changes will INCREASE the equilibrium concentration of the PRODUCTS?



i, decreasing the temperature

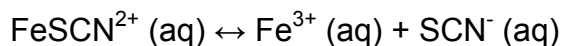
**ii, increasing the temperature**

iii, decreasing the volume

**iv, increasing the volume**

(A) i and iv (B) ii and iii (C) i and iii **(D) ii and iv** (E) iv only

3) (3 pts) For the reaction shown below, which changes, made after equilibrium is established, will force the reaction to shift to the right (production of products)?



i, adding  $\text{FeCl}_3$  (aq) shift LEFT

ii, adding NaOH (aq) NO effect!

iii, adding NaSCN (aq) shift LEFT

iv, adding NaCl (aq) NO effect!

(A) i only (B) ii, iii, iv (C) i and ii (D) iii only **(E) None of these**

4) (4 pts) The concentration of OH<sup>-</sup> ions in Drano® (NaOH) is 0.0010 M. Calculate the concentration of H<sup>+</sup> ions.

$$[\text{H}^+] = K_w/[\text{OH}^-] = (1.0 \times 10^{-14})/(0.0010) = \mathbf{1.0 \times 10^{-11} \text{ M}}$$

**Note: you can also calculate the pOH and then pH to get same answer.**

5) (4 pts) The pH of rain water is measured to be 4.82, what is the OH<sup>-</sup> concentration?

$$\text{pOH} = 14.00 - 4.82 = 9.18$$

$$[\text{OH}^-] = 10^{(-9.18)} = \mathbf{6.61 \times 10^{-10} \text{ M}}$$

6) (4 pts) Calculate the pH of a 750 mL solution made from 5.37 g of Ba(OH)<sub>2</sub> (s).  
Molar Mass Ba(OH)<sub>2</sub> = 171.33 g/mol

$$5.37 \text{ g of Ba(OH)}_2 \text{ (s)} = 0.03 \text{ mol Ba(OH)}_2 = 0.06 \text{ mol OH}^- \text{ in solution}$$

$$[\text{OH}^-] = 0.06 \text{ mol} / 0.750 \text{ L} = 0.084 \text{ M}$$

$$\text{pOH} = -\log(0.084) = 1.07$$

$$\text{pH} = 14.00 - 1.07 = \mathbf{12.93}$$