CH302 Practice Quiz 6

1. The autoprotolysis of water yields a temperature dependent $K_w$. Which of the following pairings of dissociation constant and concentration is incorrect for a pure water solution.
   1. $pK_w = 14$ and $pH = 7$
   2. $K_w = 10^{-14}$ and $[OH^-] = 10^{-7}$
   3. $K_w = 10^{-13}$ and $[OH^-] = 10^{-6.5}$
   4. $pK_w = 12.66$ and $pOH = 6.33$
   5. $K_w = 10^{-16}$ and $[H^+] = 10^{-7}$ correct

2. Which of the following pairs of compounds could be used to produce a buffer?
   I) NaOH and NH$_3$   II) HCl and NaF   III) NH$_3$ and NH$_4$Cl
   1. I only
   2. II only
   3. III only
   4. I and II only
   5. II and III only correct

3. A 0.3 M solution of barium hydroxide is prepared. Which of the following best describes this solution?
   1. very acidic
   2. very basic correct
   3. neutral correct
   4. slightly basic
   5. slightly acidic

4. A weak base NaX has $K_b = 1.0 \times 10^{-9}$. What would be the pOH of a 0.10 M solution of NaX in water?
   1. 5.00 correct
   2. 6.00
   3. 9.00
   4. 2.50
   5. 7.00

5. What is the pH of a solution in which the concentration of acetic acid is 0.2 M and the concentration of potassium acetate is 0.1 M? ($K_a$ for acetic acid = $1.8 \times 10^{-5}$.)
   1. 4.77
   2. 4.74
   3. 4.44 correct
   4. 8.31
   5. 7.19

6. The solubility product constant of AgCl is $K_{sp} = 4 \times 10^{-10}$. How many moles of AgCl dissolve in one liter of water?
   1. 2 x $10^{-5}$ mole correct
   2. 4 x $10^{-10}$ mole
   3. 16 x $10^{-20}$ mole
   4. 1 x $10^{-7}$ mole

7. Calculate the pH of the solution resulting from the addition of 50.0 mL of 0.400 M NaOH to 20.0 mL of 0.2 M HClO$_4$
   1. 13.4 correct
   2. 0.6
   3. 12.2
   4. 0.4
   5. 13.6

8. A 200 ml sample of 0.600 M ammonium nitrate solution is titrated to the equivalence point with 600 mL of 0.200 M lithium hydroxide. What is the final [H$_3$O$^+$]? The ionization constant of NH$_3$ is $1.8 \times 10^{-5}$.
   1. 6.09 x $10^{-12}$ M correct
   2. 2.8
   3. 11.2
   4. 1.6 x $10^{-3}$ M