Multiple Choice Practice

Question 1-4 refer to aqueous solutions containing 1:1 mole ratios of the following pairs of substances. Assume all concentrations are 1 M.

(A) NH_3 and NH_4Cl
(B) H_3PO_4 and NaH_2PO_4
(C) HCl and NaCl
(D) NaOH and NH_3
(E) NH_3 and $HC_2H_3O_2$ (acetic acid)

1. The solution with the lowest pH

2. The most nearly neutral solution

3. A buffer at a pH > 8

4. A buffer at a pH < 6

5. A molecule or an ion is classified as a Lewis acid if it

(A) accepts a proton from water (B) accepts a pair of electrons to form a bond
(C) donates a pair of electrons to form a bond (D) donates a proton to water
(E) has resonance Lewis electron-dot structures

6. A sample of 61.8 g of H_3BO_3, a weak acid is dissolved in 1,000 g of water to make a 1.0-molal solution. Which of the following would be the best procedure to determine to molarity of the solution? (Assume no additional information is available.)

(A) Titration of the solution with standard acid
(B) Measurement of the pH with a pH meter
(C) Determination of the boiling point of the solution
(D) Measurement of the total volume of the solution
(E) Measurement of the specific heat of the solution

7. What is the $H^+(aq)$ concentration in 0.05 M HCN (aq) ? (The K_a for HCN is 5.0×10^{-10})

(A) 2.5×10^{-11} (B) 2.5×10^{-10} (C) 5.0×10^{-10} (D) 5.0×10^{-6} (E) 5.0×10^{-4}

$$HC_2H_3O_2(aq) + CN^-(aq) <===> HCN(aq) + C_2H_3O_2^-(aq)$$

8. The reaction represented above has an equilibrium constant equal to 3.7×10^4. Which of the following can be concluded from this information?

A) $CN^-(aq)$ is a stronger base than $C_2H_3O_2^-(aq)$
B) $HCN(aq)$ is a stronger acid than $HC_2H_3O_2(aq)$
C) The conjugate base of $CN^-(aq)$ is $C_2H_3O_2^-(aq)$
D) The equilibrium constant will increase with an increase in temperature.
E) The pH of a solution containing equimolar amounts of $CN^-(aq)$ and $HC_2H_3O_2(aq)$ is 7.0.

9. The volume of distilled water that should be **added** to 10.0 mL of 6.00 M HCl(aq) in order to prepare a 0.500 M HCl(aq) solution is approximately

A) 50.0 mL B) 60.0 mL C) 100. mL D) 110. mL E) 120. mL