Buffers

Practice Problems

1. What is the pH of a solution made by adding 0.400 moles of methylammonium chloride to 1.00 liters of 0.900 M methylamine? The Ka for methylammonium ion is 2.3 x 10-11.

2. How many milliliters of 1.00 M NaOH would you need to add to 500.0 ml of 0.400 M hydrocyanic acid to make a solution with a pH of 9.00? The pKa for HCN is 9.21.

3. How many moles of carbonic acid (H2CO3) and sodium bicarbonate (NaHCO3) would you need to make a buffer that was 0.300 M and had a pH of 6.50?

Multiple Choice

1. The Ka for acetic acid is 1.7 x 10-5. What would be the pH of a solution made by combining 100.0 ml of a 0.500 M acetic acid solution with 100.0 ml of a 0.500 M sodium acetate solution?

A) 4.8 B) 1.7 C)0.0 D) 7.0

2. Which of the following could you add to a solution of nitrous acid (HNO2) to make a buffer?

A)HNO3 B) NO3- C) KOH D) HCl

3. Which of the following pairs would produce a buffer solution?

A) H2CO3 and Na2CO3
B) H2SO4 and H2SO3
C) CH3NH2 and OH-
D) H3PO4 and NaH2PO4

4. You want to calculate the pH of a phosphate buffer made from Na2HPO4 and Na3PO4. What is the value for pKa that you would use? The Ka’s for phosphoric acid are 2.16, 7.19, and 12.32.

A) 2.16 B)7.19 C)7.22 D)12.32

5. A buffer was made containing 0.500 moles of formic acid and 0.475 moles of potassium formate per liter. A small amount of sodium hydroxide was added to the buffer. Which of the following statements is true? The pKa for formic acid is 3.75

A) the initial pH will be a little above 3.75, adding sodium hydroxide slightly lowers the pH

B) the initial pH will be a little below 3.75, adding sodium hydroxide slightly lowers the pH

C) the initial pH will be a little above 3.75, adding sodium hydroxide slightly increases the pH

D) the initial pH will be a little below 3.75, adding sodium hydroxide slightly increases the pH

6. Which of the following is the Henderson-Haselbalch equation?

A) pH = -log Ka B) pH = pKa + log ([A]/[HA]) C) pH = pKa + log ([HA/[A])

D) pka = pH + log [HA]