

## Part III

1) A 25 mL sample of 0.20 M HF is titrated with a 0.20 M NaOH. Determine the pH of the solution after the addition of each quantity of the NaOH given below:  $K_a = 6.8 \times 10^{-4}$

a) 20.0 mL NaOH

pH= \_\_\_\_\_

b) 25.0 mL NaOH

pH= \_\_\_\_\_

c) 30.0 mL NaOH

pH= \_\_\_\_\_

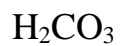
2) What is the pH of a buffer solution that is 0.20 M  $\text{CH}_3\text{NH}_2$  and 0.30 M  $\text{CH}_3\text{NH}_3\text{Cl}$ ? The  $K_b$  for  $\text{CH}_3\text{NH}_2$  is  $4.4 \times 10^{-4}$ .

3) One liter of a buffer solution contains 0.120 mole of benzoic acid, and 0.105 mol of sodium benzoate. What is the pH of the buffer before and after the addition of 0.011 mol of NaOH? The  $\text{p}K_a$  of benzoic acid is 4.20

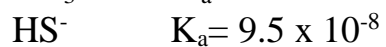
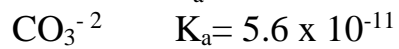
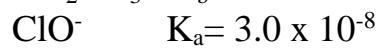
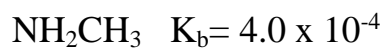
Before \_\_\_\_\_ After \_\_\_\_\_

4)

a) Arrange the acids from strongest to weakest.



b) Arrange the bases from strongest to weakest.



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Formulas:

$$\text{pH} = \text{p}K_a + \log \frac{[\text{conj base}]}{[\text{acid}]}$$

$$\text{pOH} = \text{p}K_b + \log \frac{[\text{conj acid}]}{[\text{base}]}$$