SAPIENZA
UNIVERSITÀ DI ROMA

International Medical School
Course of Chemistry and Introduction to Biochemistry
Academic Year 2014-2015

Summary exercises

1. Calculate the pH of a solution prepared by mixing 100 ml of methanoic acid 0.1 M with 25 ml of sodium hydroxyde 0.16 M. ($K_a = 1.8 \cdot 10^{-4}$ M at 25°C).
2. Calculate the pH of a solution prepared by mixing 100 ml of methanoic acid 0.04 M with 25 ml of sodium hydroxyde 0.16 M. ($K_a = 1.8 \cdot 10^{-4}$ M at 25°C)
3. A solution has been prepared by mixing 450 ml of ammonia 0.1 M with 250 ml of HCl 0.1 M. Which is the pH? ($K_b = 1.8 \cdot 10^{-5}$ M at 25°C)
4. Calculate the pH of a solution obtained by diluting 1 ml of the commercial solution of ammonia (30%w, d=0.91g/ml) up to 1 L with pure water. Calculate the pH after having added 1g of HCl ($K_b = 1.8 \cdot 10^{-5}$M at 25°C)
5. Calculate the formula weight and the dissociation coefficient of a weak monoprotic acid, whose solution made by dissolving 1g in 1 L of pure water has pH=4.0. ($K_a = 3 \cdot 10^{-6}$M)
6. Calculate which volume of NaOH 1M needs to be added to a 1 L of a buffer solution containing acetic acid 0.01 M and sodium acetate 0.01 M in order to adjust the pH to 5.0 ($K_a = 1.8 \cdot 10^{-4}$ M at 25°C, approximate the volume to remain constant).
7. A solution of HNO_2 is made by dissolving 3.53 g in 500 ml of pure water at 25°C. Calculate its dissociation coefficient, knowing that this solution has an osmotic pressure of 3.87 atm.
8. Calculate the osmotic pressure of a solution of potassium acetate at 25°C, knowing that its pH is 9.02. ($K_a = 1.8 \cdot 10^{-5}$ M)