Tutorial 3

312BCH

Q1: Calculate :

1. [H+ ] , b)[OH- ] , c) pH , d) pOH of the final solution obtained after 100ml of 0.2M NaOH are added to 150ml of 0.4M H2SO4  .

Q2: How many grams of solid KOH are required to neutralize 2L of an HCl solution of pH 2 ?

Q3: The pH of a 0.27M solution of a weak acid , HA , is 4.3 . a) What is the [H+ ] in the solution ? b) what is the degree of ionization of the acid ? c) what is the Ka ?

Q4: Describe the preparation of 40 L of 0.02M of phosphate buffer , pH 6.9 starting from a) a 2M H3PO4 solution and a 1M KOH solution . b) solid KH2PO4 and K2HPO4 c) solid Na3PO4 and 1M HCl .

Q5: An enzyme –catalyzed reaction was carried out in a solution containing 0.2M Tris buffer . The pH of the reaction mixture at the start was 7.8 . As a result of the reaction , 0.03mole/liter of OH-  was produced .

a)what was the ratio of Tris ° / Tris+ ratio at the end of the reaction c) what was the final pH of the reaction mixture ? d) what would the final pH be if no buffer were present ? e) write the chemical equation showing how the Tris buffer maintained a near constant pH during the reaction . pKa of Tris = 8.1.

Q6: What volume of glacial acetic acid (density 1.06g/ml ) and what weight of solid potassium acetate are required to prepare 5L of 0.2M acetate buffer ,

pH = 5.0 ?

Q7: Blood plasma at pH 7.4 contains 2.4 x 10-2 M HCO3- and 1.2 x 10-3  CO2 . Calculate the pH after the addition of 3.2 x 10-3 M H+  . Assume that the concentration of dissolved CO2  is maintained constant at 1.2 x 10-3 M by the release of excess CO2 ?

Q8: Design a shortcut method for preparing a 0.5M Phosphate buffer ,

pH = 7.0 , where only one form of phosphate is provided ?