Acid-base titration lab

Science, Chemistry

Acid-Base Titration Objectives: 1. To titrate a hydrochloric acid solution of unknown concentration with standardized 0. 10M sodium hydroxide. 2. To utilize the titration data to calculate the molarity of the hydrochloric acid. Materials: See handout for more info. Procedure: See handout for more info. Data and Calculations: Table 1: Volume of NaOH Required to Neutralize 10. 00mL of Unknown HCl

Molarity of NaOh	Trial 1	Trial 2	Trial 3	Trial 4
Initial Volume of NaOH(mL)	0. 0	11. 00	20. 85	30. 45
Final Volume of NaOH(mL)	11. 00	20. 85	30. 45	39. 98
Volume of NaOH used(mL)	11. 00 (Cancel out)	9. 85	9. 60	9. 53

Average Volume of NaOH = (9. 85+9. 60+9. 53)/3 = 9. 66mL Sample Calculations: (9. 85+9. 60+9. 53)/3 = 9. 66mL The average volume of NaOH used. Calculations: 1. Moles NaOH = M x V = (0. 1M) (0. 00966L) = 0. 000966 moles 2. Moles HCl = moles NaOH 0. 000966 moles -> 9. 66x10-4 3. NaOH + HCl = NaCl + H2O Moles NaOH = M x V = (0. M)(0. 00966L) = 0. 000966 moles Moles HCl = moles NaOH [HCl] = moles/volumes = (0. 000966)/ (0. 0096L) [HCl] = 0. 1M Follow-up Questions: 1. It will have no effect because the phenolphthalein only changes color depending on the pH level. Adding substances that will not change the pH level will have no effect. 2. We rinsed out the buret with NaOH, it is to neutralize any leftover acids that may have existed from previous experiments that the buret may have been used in. 4.

When we added the NaOH, it instantly neutralized the HCl but because of HCl having more moles inside the beaker, the excess HCl instantly reverting the system back into a base. 5. [HCl] = 0. 1M pH = -log[HCl] pH = -log(0. 1M) pH = 1 Conclusion: By using the titration data, we found out that the molarity of HCl is equal to the concentration of NaOH. This happens because the system

is in a one-to-one relationship between the two compounds. If we use the same amount of volume of HCl and NaOH, and mix the two, it will reach to a neutral pH value.