

Name:.....

Date:.....

CHEMISTRY HOMEWORK 5.2 – WEAK ACIDS, INDICATORS AND TITRATIONS

| | | |
|----|---|----|
| 1. | <p>Nitric acid is a strong acid. It has the formula HNO_3. Citric acid is a weak acid. It has the formula $\text{HC}_6\text{H}_7\text{O}_7$.</p> <p>In an experiment to compare the properties of citric acid and nitric acid, Danius added magnesium carbonate powder slowly to 50 mL of 0.10 mol/L $\text{HC}_6\text{H}_7\text{O}_7$ until no more magnesium carbonate powder dissolved. Danius then repeated the experiment using 50 mL of 0.10 mol/L HNO_3 instead of 50 mL of 0.10 mol/L $\text{HC}_6\text{H}_7\text{O}_7$.</p> <p>After the reaction, Danius added a small quantity of methyl orange indicator to the mixture to check whether the acid had been completely neutralised.</p> | |
| | (a) Write an equation to show the dissociation of nitric acid (HNO_3) in water. | /2 |
| | (b) Write an equation to show the dissociation of citric acid ($\text{HC}_6\text{H}_7\text{O}_7$) in water. | /2 |
| | (c) State, with a reason, whether 0.10 mol/L citric acid or 0.10 mol/L nitric acid would have a lower pH. | /3 |
| | (d) Identify one similarity and one difference Danius would expect to observe between the reactions of 50 mL of 0.10 mol/L $\text{HC}_6\text{H}_7\text{O}_7$ and 50 mL of 0.10 mol/L HNO_3 with magnesium carbonate. | /2 |
| | (e) State the color shown by methyl orange indicator if: The acid had been neutralized: The acid had not been neutralized: | /2 |

Name:.....

Date:.....

| | | |
|-------|---|-----|
| 2. | <p>Nina wants to find the molarity of a sample of nitric acid which she has found in a cupboard. She decides to use a standard solution of 0.050 mol/L NaOH in order to do this.</p> <p>Nina uses a pipette to transfer 15 mL of the NaOH solution into a conical flask and adds a few drops of phenolphthalein indicator.</p> <p>Nina places the nitric acid solution into a burette and adds it slowly to the NaOH solution until the indicator changes color. She needs 12.4 mL of nitric acid to do this.</p> | |
| (a) | What is meant by the term "standard solution"? | /1 |
| (b) | Write an equation for the reaction between nitric acid and sodium hydroxide solution. | /2 |
| (c) | State the initial color of the indicator, and its color at the equivalence point. Initial color: Color at equivalence point: | /2 |
| (d) | Calculate the molarity of the nitric acid solution. | /3 |
| TOTAL | | /15 |