

Name:.....

Date:.....

**CHEMISTRY HOMEWORK 5.2 – WEAK ACIDS, INDICATORS AND TITRATIONS**

1.	<p>Nitric acid is a strong acid. It has the formula <math>\text{HNO}_3</math>. Citric acid is a weak acid. It has the formula <math>\text{HC}_6\text{H}_7\text{O}_7</math>.</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 <math>\text{HC}_6\text{H}_7\text{O}_7</math> until no more magnesium carbonate powder dissolved. Danius then repeated the experiment using 50 mL of 0.10 mol/L <math>\text{HNO}_3</math> instead of 50 mL of 0.10 mol/L <math>\text{HC}_6\text{H}_7\text{O}_7</math>.</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 ( $\text{HNO}_3$ ) 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 $\text{HNO}_3$ 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