Name:………………………………………………….   Date:……………………………………………….

CHEMISTRY HONORS HOMEWORK 5.2 – WEAK ACIDS, INDICATORS AND TITRATIONS

1.	Citric acid is a weak acid. It has the formula $HC_6H_7O_7$. In a solution of 0.10 mol/L $HC_6H_7O_7$, approximately 10% of the citric acid molecules are dissociated. In an experiment to compare the properties of citric acid and nitric acid, Ahmad added magnesium carbonate powder slowly to 50 mL of 0.10 mol/L $HC_6H_7O_7$ until no more magnesium carbonate powder dissolved. Ahmad then repeated the experiment using 50 mL of 0.10 mol/L HNO_3 instead of 50 mL of 0.10 mol/L $HC_6H_7O_7$. After the reaction, Ahmad added a small quantity of an indicator to the mixture to check whether the acid had been completely neutralised.		
	(a)	Write an equation to show the dissociation of citric acid in water.	/2
	(b)	Estimate the pH of 0.10 mol/L HNO_3 …………………… 0.10 mol/L $HC_6H_7O_7$ ……………………………	/2
	(c)	Write an equation, with state symbols, to show the reaction of nitric acid with magnesium carbonate.	/3
	(d)	Calculate the maximum mass of magnesium carbonate which will dissolve in 50 mL of 0.10 mol/L HNO_3.	/3
	(e)	Identify one similarity and one difference Ahmad would expect to observe between the reactions of 50 mL of 0.10 mol/L $HC_6H_7O_7$ and 50 mL of 0.10 mol/L HNO_3 with magnesium carbonate.	/2
	(f)	Name an indicator which would show whether or not the acid had been neutralised. State the color Ahmad would see if the acid had been neutralised, and the color Ahmad would see if the acid had not been neutralised. Name of indicator: …………………………………………………………………………………………………. Color if acid neutralized: ……………………… Color if acid not neutralized: …………………………..	/3

	(g)	Name an indicator which would not work well in the above experiment and explain why it would not work. ……. ……. …….	/3
2.		Nina wants to find the molarity of a sample of sulfuric 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. Nina first prepares 250 mL of 0.05 mol/L NaOH. She then uses a pipette to transfer 15 mL of the NaOH solution into a conical flask and adds a few drops of phenolphthalein indicator. Nina places the sulfuric acid solution into a burette and adds it slowly to the NaOH solution until the indicator changes color. She needs 12.4 mL of sulfuric acid to do this.	
	(a)	What is meant by the term "standard solution"?	/1
	(b)	Calculate the mass of NaOH Nina would need to make 250 mL of 0.05 mol/L NaOH.	/3
	(b)	Write an equation for the reaction between sulfuric 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 sulfuric acid solution.	/3
		TOTAL	/25