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Year 12 Laboratory Analysis of Organic Compounds Topic Test

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**Question 1**

Complete the table below.

**16 marks**

Chemical Test for	Name of method or description of method	Observations	Explanation
C=C		A red-orange colour decolourises	
	Lucas test		
COOH		A strong, sweet odour forms	
	Reaction between propanoic acid and sodium bicarbonate		
			An aldehyde is oxidised and hence silver solid is formed
	Potassium Permanganate Test		

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**Question 2**

The purity of a solid compound can be determined by its melting point. Discuss how the purity is analysed.

**3 marks**

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**Question 3**

A mixture of ethanol and octane is to be separated via distillation. The boiling points of ethanol and octane are 78°C and 125°C respectively. Which distillation, simple or fractional, would be most suitable for this application?

**2 marks**

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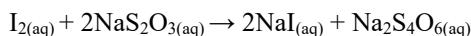
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**Question 4**

25.00ml of 0.010M iodine solution reacts with 20.00ml of 0.0040M thiosulfate solution according to the following reaction.



Identify the limiting and excess reactant.

**3 marks**

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**Question 5 (9 marks)**

A 0.5M standardised solution of iron(II) sulfate,  $FeSO_4$ , was reacted with a 25.00ml aliquot of acidified potassium permanganate solution,  $KMnO_4$ . The average concordant titre is 24.10ml. Iron(II) ion is converted to iron(III) ion, and permanganate ion is converted to manganese(II) ion.

**(a)** Write the balanced oxidation equation.

**1 mark**

**(b)** Write the balanced reduction equation.

**1 mark**

**(c)** Write the balanced overall redox equation.

**1 mark**

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(d) Determine the concentration of potassium permanganate solution in mol L<sup>-1</sup>. **3 marks**

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(e) This titration does not require an indicator. Why is this the case? **1 mark**

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(f) Define the difference between the end point and equivalence point. **2 marks**

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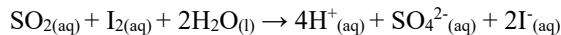
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**Question 6 (15 marks)**

Consider the following reaction below,



Sulfur dioxide is important for the preservation of wine as it prevents oxidation that can diminish the colour and flavour of wine. A chemist wants to experimentally determine the concentration of sulfur dioxide in a sample of wine for quality control. To prepare the wine sample for titration, 30.00ml of wine was transferred to a volumetric flask and filled to the 150.0ml mark with deionised water. An average titre of 14.95ml of a 0.100M iodine solution was used to react with a 20.00ml aliquot of wine.

**(a)** Calculate the concentration of the diluted sulfur dioxide in  $\text{g L}^{-1}$ . **4 marks**

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**(b)** Determine the concentration of the undiluted sulfur dioxide in the original wine in  $\text{mol L}^{-1}$ . **3 marks**

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**(c)** The chemist rinsed the burette with deionised water. How would this affect the final concentration of the sulfur dioxide? **3 marks**

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**(d)** The average concordant titre was obtained from three titrations performed by the chemist. How does the average concordant titre influence the reliability of the experiment? **3 marks**

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**(e)** Discuss one systematic error that may affect the calculation of the final concentration of sulfur dioxide. **2 marks**

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**Question 7 (3 marks)**

After reacting fully with iodine, 0.250g of an unknown oil consumed 1.50ml of 0.10M sodium thiosulfate solution.

**(a)** Calculate its iodine value.

**1 mark**

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Lipid	Iodine value	Saturation	State at room temperature	Fat or oil classification
Butter	25-40	Saturated 70% Unsaturated 30%	Solid	Fat
Olive Oil	75-95	Saturated 25% Unsaturated 75%	Liquid	Oil
Canola Oil	125-135	Saturated 6% Unsaturated 94%	Liquid	Oil

**(b)** Comment on the degree of saturation and its state at room temperature based on the table above.

**2 marks**

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