
Year 12 Laboratory Analysis of Organic Compounds Topic Test

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

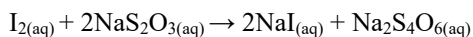
Question 3

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

Question 4

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



Identify the limiting and excess reactant.

3 marks

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⁻¹.

3 marks

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

1 mark

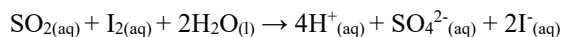
(f) Define the difference between the end point and equivalence point.

2 marks

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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 g L^{-1} . **4 marks**

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

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

- (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**

- (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

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
