## SUNSHINE SECONDARY SCHOOL MOCK 2019 CHEMISTRY PAPER 3

## 1. You are provided with:

- Solution P of Potassium manganate (VII).
- 0.05M solution Q of oxalic acid.
- Solution R containing 4.9g of ammonium iron (II) Sulphate, (NH<sub>4</sub>)<sub>2</sub> SO<sub>4</sub>.FeSO<sub>4</sub>.6H<sub>2</sub>O, in 250cm<sup>3</sup> of water.

## You are required to:

- i) Determine the rate of reaction between oxalic acid and Potassium manganate (VII).
- ii) Standardize the solution P.

## **PROCEDURE I:**

Using a measuring cylinder, place 1 cm<sup>3</sup> of solution P into each of the five (5) test-tubes in a rack. Clean the measuring cylinder and use it to place 19 cm<sup>3</sup> of solution Q into a boiling tube. Prepare a water bath by placing about 200 cm<sup>3</sup> of water into a beaker and start to heat. Place a thermometer into solution Q and place it in the warm water until it attains a temperature of 40°C. Remove the boiling tube from the water – bath and place it in the test-tube rack. Add the first portion of solution P immediately and at the same time start a stop watch. Record the time taken for solution P to be decolourised in table I below. Repeat the procedure at temperatures of 50°C, 60°C, 70°C and 80°C to complete the table.

Temperature of solution Q ( <sup>0</sup> C)	40	50	60	70	80
Time taken for decolourisation (tsecs)					
1/t sec <sup>-1</sup>					

i) Plot a graph of 1/t against temperature (X-axis).

(3marks)

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ii) From the graph determine the time taken fo				(3marks)
iii) How does the rate of reaction between				ate (VII) vary with
temperature?				(1mark)
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PROCEDURE II				
Fill a burette with solution P. Pipette 25cm <sup>3</sup>	of solution	R into a con	ical flask and t	itrate the solution I
against solution R until a permanent pink col				
repeat the procedure to fill the table.	0 11			
	I	II	III	
Final burette reading (cm <sup>3</sup> )				
Initial burette reading (cm <sup>3</sup> )				
Volume of solution P used (cm <sup>3</sup> )				
i) Determine the average volume of P used		cm <sup>3</sup>		(1mark)
(Show how you arrive at your answer)	1 1	F. (F. 56	C 22 O 16 N	I 14 II 1)
ii) Calculate the concentration of solution R in	moies per i	ntre. (Fe=36,	S=32, O=16, N	
				(2marks)
iii) Find the number of moles of solution R use	ed			(1mark)
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iv) Given the ionic equation for the reaction is				
$5Fe^{2+}(aq) + MnO_4(aq) + 8H^+(aq)$ ———	→ 5Fe <sup>3+</sup> (ac	$q) + Mn^{2+}(aq)$	$+4H_2O(1);$	
Find the number of moles of solution P used.				(1mark)

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 v)	Determine the concentration of the	he Potassium manga	anate (VII), solution P in moles per litre. (2 marks)
	ou are provided with solid B. Car he table below.	ry out the tests belo	ow and record your observations and inferences in
i)	Place half a Spaluta full of solid I	B in a clean dry test-	tube and heat gently then strongly.
	Observations		Inferences
		(1mark)	(1mark)
	Observations		Inferences
		(1mark)	(1mark)
	a) To the first portion add Sodiur	n hydroxide solutio	n dropwise until in excess.
	Observations		Inferences
		(1mark)	(1mark)
	b) To the second portion add 2-3	drops of dilute Sulp	phuric (VI) acid
	Observations		Inferences

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(1ma	rk) (1mar
To the third portion add aqueous ammonia drop	
Observations	Inferences
(1ma	rk) (1 mar
To the fourth portion add 2-3 drops of barium r	nitrate solution
Observations	Inferences
(1ma	rk) (1mar
are provided with solid L. Carry out the tests be the spaces provide.  Place half of solid L in a boiling tube and add	rk) (1 mar elow on L and record the observations and inference about 5 cm <sup>3</sup> of distilled water. Divide the resulting
are provided with solid L. Carry out the tests be the spaces provide.  Place half of solid L in a boiling tube and addractive into two portions for the tests below:	relow on L and record the observations and inference about 5cm <sup>3</sup> of distilled water. Divide the resulting
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Observations

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