

FORM TP 2015160



TEST CODE 02212032

MAY/JUNE 2015

CARIBBEAN EXAMINATIONS COUNCIL
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION®

CHEMISTRY

UNIT 2 – Paper 032

ALTERNATIVE TO SCHOOL-BASED ASSESSMENT

2 hours

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This paper consists of THREE questions. Answer ALL questions.
2. Write your answers in the spaces provided in this booklet.
3. Do NOT write in the margins.
4. Where appropriate, ALL WORKING MUST BE SHOWN in this booklet.
5. A data booklet is provided.
6. You may use a silent, non-programmable calculator to answer questions.
7. You are advised to take some time to read through the paper and plan your answers.
8. If you need to rewrite any answer and there is not enough space to do so on the original page, you must use the extra lined page(s) provided at the back of this booklet. **Remember to draw a line through your original answer.**
9. **If you use the extra page(s) you MUST write the question number clearly in the box provided at the top of the extra page(s) and, where relevant, include the question part beside the answer.**

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

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Answer ALL questions.

1. (a) You are provided with three samples of organic compounds labelled A, B and C.

Carry out the tests indicated in Table 1 being careful to add reagents gradually until no further change is observed and shake gently after each addition.

The results are to be entered into Table 1 on page 3.

Your recordings should include details of colour changes and precipitates formed.

[12 marks]

- (b) Based on your observations in Table 1, identify the class of compound to which EACH sample belongs.

A

B

C

[3 marks]

- (c) State reasons for your answers in (b) above.

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.....

[3 marks]

Total 18 marks



TABLE 1: TESTS ON ORGANIC COMPOUNDS, A, B AND C

Test	Observation		
	A	B	C
Carry out the following tests on approximately 2 cm ³ of each sample of A, B and C.			
(i) Add approximately 2 cm ³ of 2, 4-DNPH.			
(ii) Add approximately 2 cm ³ of acidified potassium permanganate or potassium dichromate.			
(iii) To approximately 2 cm ³ of AgNO ₃ solution, add 2 drops of NaOH (aq) followed by 2 drops of NH ₃ (aq) until the precipitate dissolves. Add the sample compound and warm the mixture.			
(iv) Add 1 cm ³ of I ₂ /KI (aq) followed by NaOH (aq) dropwise until the iodine colour is removed. Warm the mixture.			

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2. Sodium oxalate, $\text{Na}_2\text{C}_2\text{O}_4$, was selected as a primary standard for the standardization of potassium permanganate solution. The sodium oxalate was accurately weighed based on the data in Table 2, and 25 cm^3 portions of the oxalate solution was titrated against the permanganate solution.

TABLE 2: MASS OF SODIUM OXALATE

	Mass (g)
Mass of bottle and oxalate	43.3920
Mass of bottle	41.7420

- (a) (i) Determine the mass of sodium oxalate used.

..... [1 mark]

- (ii) Suggest a reason for the use of sodium oxalate as a primary standard.

.....
.....
..... [1 mark]

- (b) Figure 1 shows the reading on the burette before and after each titration.

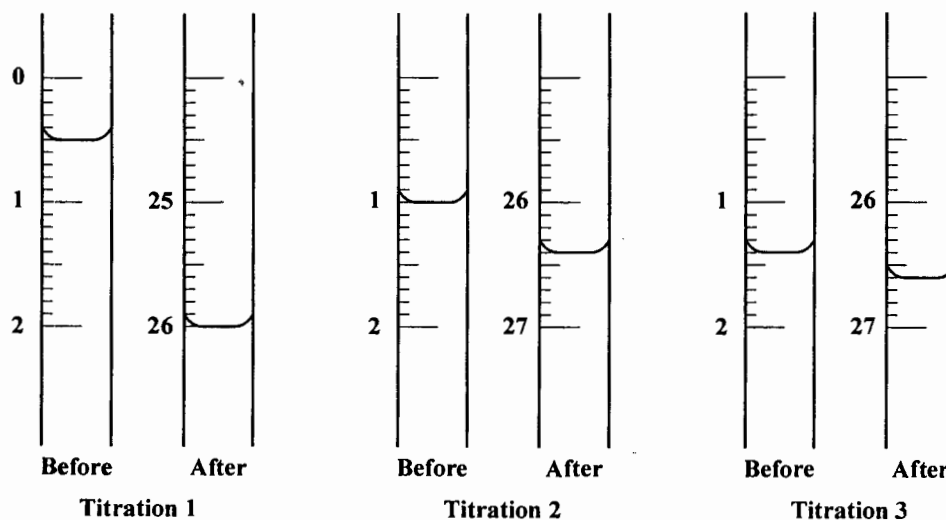


Figure 1. Burette readings



(i) What colour change should be expected at the end point of EACH titration?

.....

[1 mark]

(ii) Using the readings in Figure 1, record the titre volumes of the experiment in Table 3.

TABLE 3: TITRE VOLUMES

	Experiment 1	Experiment 2	Experiment 3	
Final volume of KMnO_4 (cm^3)				
Initial volume of KMnO_4 (cm^3)				Average Volume to be used (cm^3)
Volume of KMnO_4 used (cm^3)				

[5 marks]

(c) Outline the steps that were taken in performing the titration.

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[3 marks]

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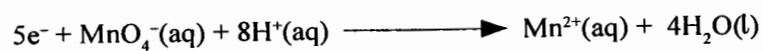
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- (d) Determine the concentration of the sodium oxalate solution made in mol dm⁻³.

[2 marks]

- (e) The two half-equations below represent the changes in the oxalate and permanganate substances in the redox reaction.



Write the ionic equation for the reaction occurring in the titration.

.....
[2 marks]

- (f) Calculate the concentration of the potassium permanganate solution in mol dm⁻³.

.....
.....
[3 marks]

Total 18 marks



3. Two bottles of the same brand of wine were found in a chemistry laboratory. One bottle was opened and the other unopened. A student suggested that the ethanol in the opened bottle of wine had been oxidized to ethanoic acid (vinegar). Plan and design an experiment to test the validity of this suggestion using the following guidelines.

Your answer should include:

- (a) Hypothesis

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.....

[1 mark]

- (b) Aim

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[1 mark]

- (c) Reagents and apparatus

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[2 marks]

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(d) Experimental procedure

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.....

[3 marks]

(e) Variables

(i) Manipulated

.....

[1 mark]

(ii) Controlled

.....

[1 mark]

(iii) Responding

.....

[1 mark]

(f) Expected results

.....
.....
.....

[2 marks]

Total 12 marks

END OF TEST

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.

