

FORM TP 2017170



TEST CODE **02112032**

MAY/JUNE 2017

**CARIBBEAN EXAMINATIONS COUNCIL**

**CARIBBEAN ADVANCED PROFICIENCY EXAMINATION®**

**CHEMISTRY**

**UNIT 1 – 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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02112032/CAPE 2017



Answer ALL questions.

1. Substance **R** is a mixture of two simple salts, one containing the sodium cation,  $\text{Na}^+$ . You are asked to carry out the following tests on Substance **R**.

Reagents should be added gradually, with gentle shaking after EACH addition, until no further change is observed.

Record your deductions alongside the relevant observations in Table 1.

Include in your recordings:

- Details of colour changes and precipitates formed
- The names of **gases** evolved and the details of the tests used to identify EACH gas

TABLE 1: OBSERVATIONS AND DEDUCTIONS

Test	Observation	Deduction
(a) Heat strongly a small quantity of <b>R</b> and allow to cool.  Test for gas evolved.  Observe residue.	<ul style="list-style-type: none"><li>•</li><li>•</li></ul>	<ul style="list-style-type: none"><li>•</li><li>•</li></ul>
	[3 marks]	[2 marks]
(b) To a small sample of <b>R</b> , add dilute HCl and warm.	<ul style="list-style-type: none"><li>•</li></ul>	<ul style="list-style-type: none"><li>•</li></ul>
	[2 marks]	[1 mark]
(c) To another small sample of <b>R</b> , add concentrated $\text{H}_2\text{SO}_4$ and heat carefully.	<ul style="list-style-type: none"><li>•</li></ul>	<ul style="list-style-type: none"><li>•</li></ul>
	[2 marks]	[1 mark]

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Test	Observation	Deduction
(d) Dissolve a spatula-full of <b>R</b> in minimum volume of dilute hydrochloric acid (warming if needed). Dilute with water to half of a test tube. Divide the solution into two portions and carry out the following tests.  (i) To the first sample of the solution add NaOH(aq).		[1 mark]
		[3 marks]
(ii) To the second sample of the solution add AgNO <sub>3</sub> (aq).		[1 mark]

(e) Write the chemical formula for the **other** product formed with water when excess NaOH(aq) is added in (d) (i).

.....  
[1 mark]

**Total 18 marks**

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2. An experiment was carried out to investigate the effect of temperature on the volume of a gas. Observations of the changes in the volume of 0.100 moles of a gas at atmospheric pressure were made as the temperature was varied. Figure 1 shows seven readings of the temperature of the gas measured by the thermometer, and the corresponding volumes of the gas.

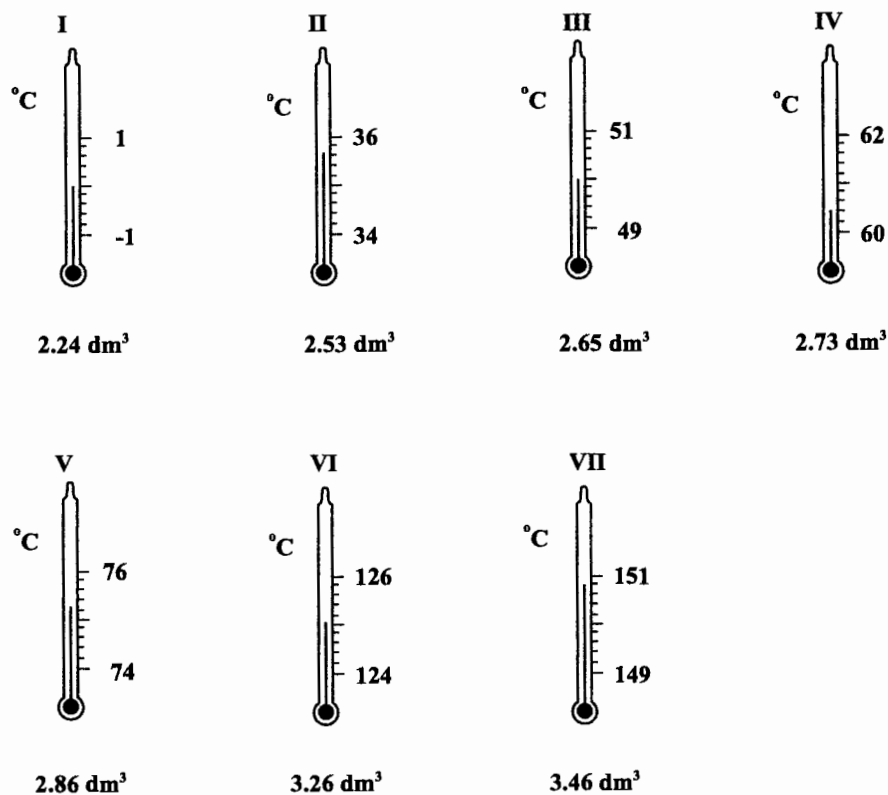


Figure 1. Temperature of gas measured in °C

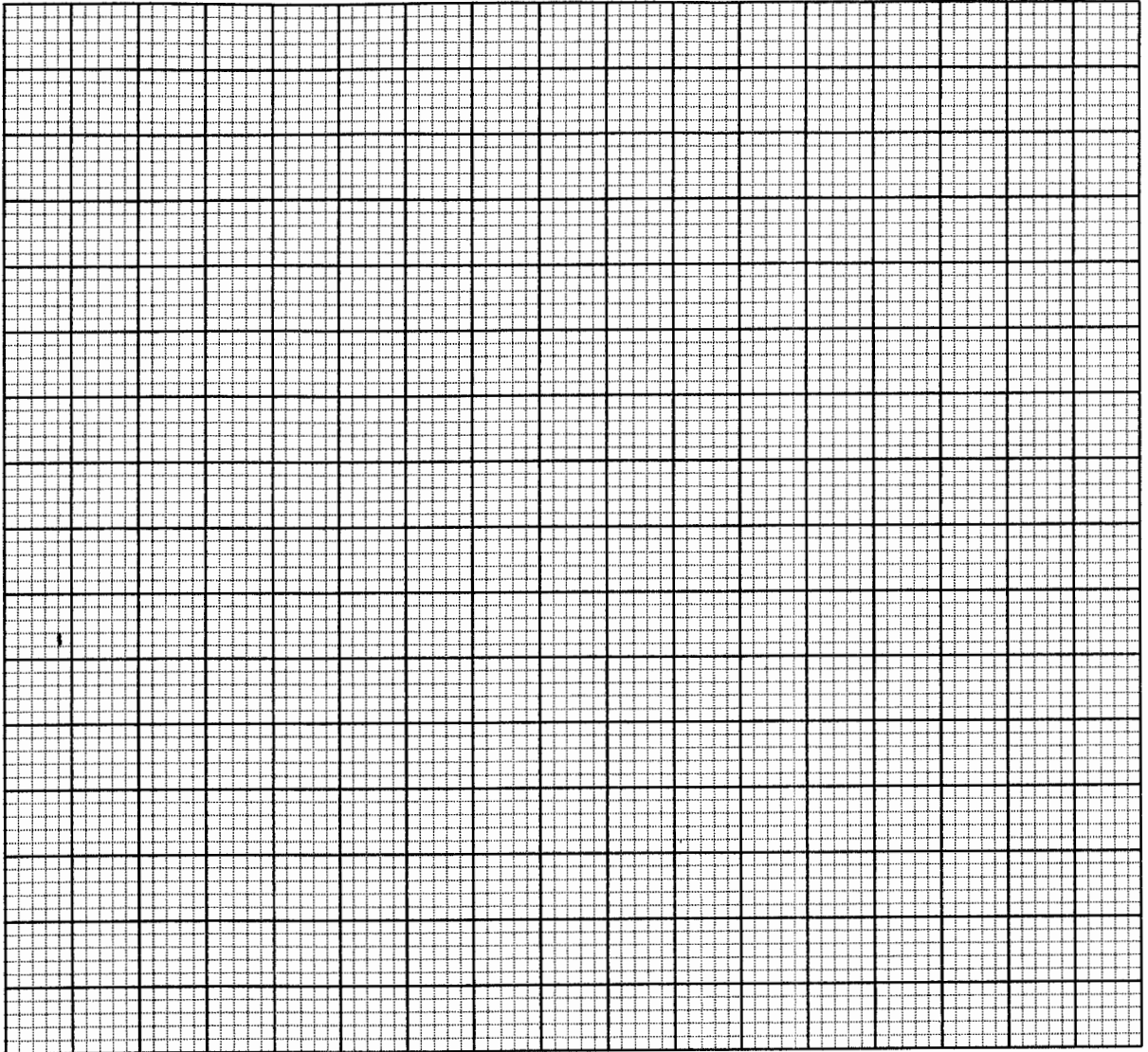
- (a) Present the data provided above, as well as the temperature T(K), in a tabular format.

[5 marks]

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- (b) On the grid provided below, plot a graph of volume of gas  $V(\text{dm}^3)$  against temperature  $T(\text{K})$ , circling the plotted points  $\otimes$ . [4 marks]



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(c) From your graph, deduce the

(i) volume occupied by the gas at a temperature of 373 K

..... [1 mark]

(ii) relationship between the volume (V) of the gas and the temperature (T).

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

(d) Write an equation to represent the relationship in (c) (ii).

..... [1 mark]

(e) State the significance of the gradient in relation to the equation in (d).

..... [1 mark]

(f) Calculate the value of the gradient of the graph, stating the relevant units.

[3 marks]

Total 16 marks



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3. Natural gas and propane are two fuels which provide energy for domestic use in Caribbean homes. A science class was given the task of determining which of these fuels is more economical in the provision of energy.

Plan and design an experiment that would allow the students to accomplish this task.

Your answer should include the following:

- (a) Hypothesis

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

- (b) Aim

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

- (c) Apparatus and materials

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

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(d) Experimental method

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

[3 marks]

(e) Variables

(i) Manipulated

.....

(ii) Responding

.....

(iii) Controlled

.....

[3 marks]

(f) Expected results

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

[1 mark]



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(g) Treatment of results

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.....  
.....

[1 mark]

(h) ONE source of error in the experiment

.....

[1 mark]

**Total 14 marks**

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**END OF TEST**

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

