

**FORM TP 2010150**



TEST CODE **02112032**

MAY/JUNE 2010

**C A R I B B E A N   E X A M I N A T I O N S   C O U N C I L**

**A D V A N C E D   P R O F I C I E N C Y   E X A M I N A T I O N**

**C H E M I S T R Y**

**U N I T   0 1   –   P a p e r   0 3 / 2**

**A L T E R N A T I V E   T O   I N T E R N A L   A S S E S S M E N T   E X A M I N A T I O N**

*2 hours*

**You are advised to use the first 10 minutes  
for reading through this paper carefully.**

**READ THE FOLLOWING DIRECTIONS CAREFULLY.**

- 1. Answer ALL questions on this paper.**
- 2. Use this answer booklet when responding to the questions. For EACH question, write your answer in the space indicated and return the answer booklet at the end of the examination.**
- 3. The use of silent, non-programmable calculators is allowed.**
- 4. A data booklet is provided.**

1. (a) Solid A is a mixture of two simple salts, one of which contains an alkali metal cation. You are required to carry out the following tests, being careful to add reagents gradually until no further change is observed, and gently shaking after each addition. Record your observations and relevant deductions in the table provided.

Include in your recordings

- details of colour changes and precipitates formed
- the names of gases evolved and details of the test used to identify EACH one.

Test	Observations	Deductions
(i) Heat a small quantity of A with dilute HCl. Test for gas evolved.	[ 1 mark ]	[ 2 marks]
Shake A with distilled water for 2 mins, filter, keep residue and use filtrate to perform Test (ii) and Test (iii).		
(ii) Add $\text{AgNO}_3(\text{aq})$ followed by dilute $\text{HNO}_3$ .	[ 1 mark ]	[ 2 marks]
(iii) Add $\text{Cl}_2(\text{aq})$ followed by about $2 \text{ cm}^3$ of organic solvent B.	[ 1 mark ]	[ 1 mark ]
Wash residue with distilled water, pierce filter paper, wash residue into boiling tube with dilute $\text{H}_2\text{SO}_4$ , warm to dissolve solid. Carry out Tests (iv) and (v) with portions of the solution.		

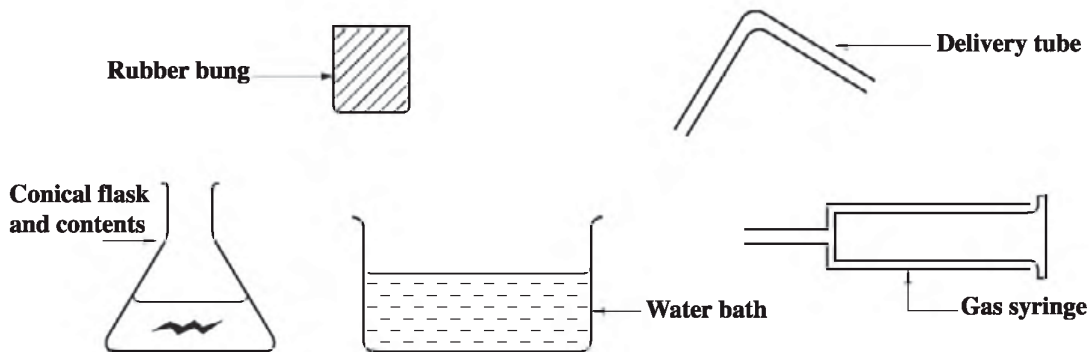
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(iv) Add NaOH(aq), let stand for about 2 mins, then add H <sub>2</sub> O <sub>2</sub> .	[ 3 marks]	[ 2 marks]
(v) Add a few grains of oxidizing agent C.	[ 1 mark ]	[ 2 marks]

**Total 12 marks**

2. A student is given the task of investigating the relationship between the rate of reaction and temperature of the reaction between magnesium ribbon and dilute sulphuric acid,  $\text{H}_2\text{SO}_4$ .

The various pieces of apparatus are shown in Figure 1 below.



**Figure 1. Apparatus for the investigation**

The volume of hydrogen evolved from a known length of magnesium ribbon by a given volume of a  $1 \text{ mol dm}^{-3}$  solution of acid is measured at room temperature at various time intervals. The process is repeated at a temperature of  $40^\circ\text{C}$ .

It is found that  $52.5, 65, 78, 80, 85, 88$  and  $88 \text{ cm}^3$  of hydrogen evolve at intervals of  $0.25, 0.50, 0.75, 1.0, 1.5, 2.0$  and  $2.5$  minutes respectively, at a temperature of  $40^\circ\text{C}$ .

- (a) (i) Sketch the assembled apparatus that could be used to perform the experiment.  
**Label the sketch.**

[ 5 marks]

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- (ii) Construct a table to record the observations on page 4 regarding volume of hydrogen and time, at 40 °C.

[ 4 marks]

- (b) On the grid on page 6, which contains the plot of volume of hydrogen vs time at room temperature, plot the corresponding graph at the temperature of 40 °C. [ 4 marks]

- (c) State the time taken for 50 cm<sup>3</sup> of hydrogen to be evolved at

- (i) room temperature

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- (ii) 40 °C.

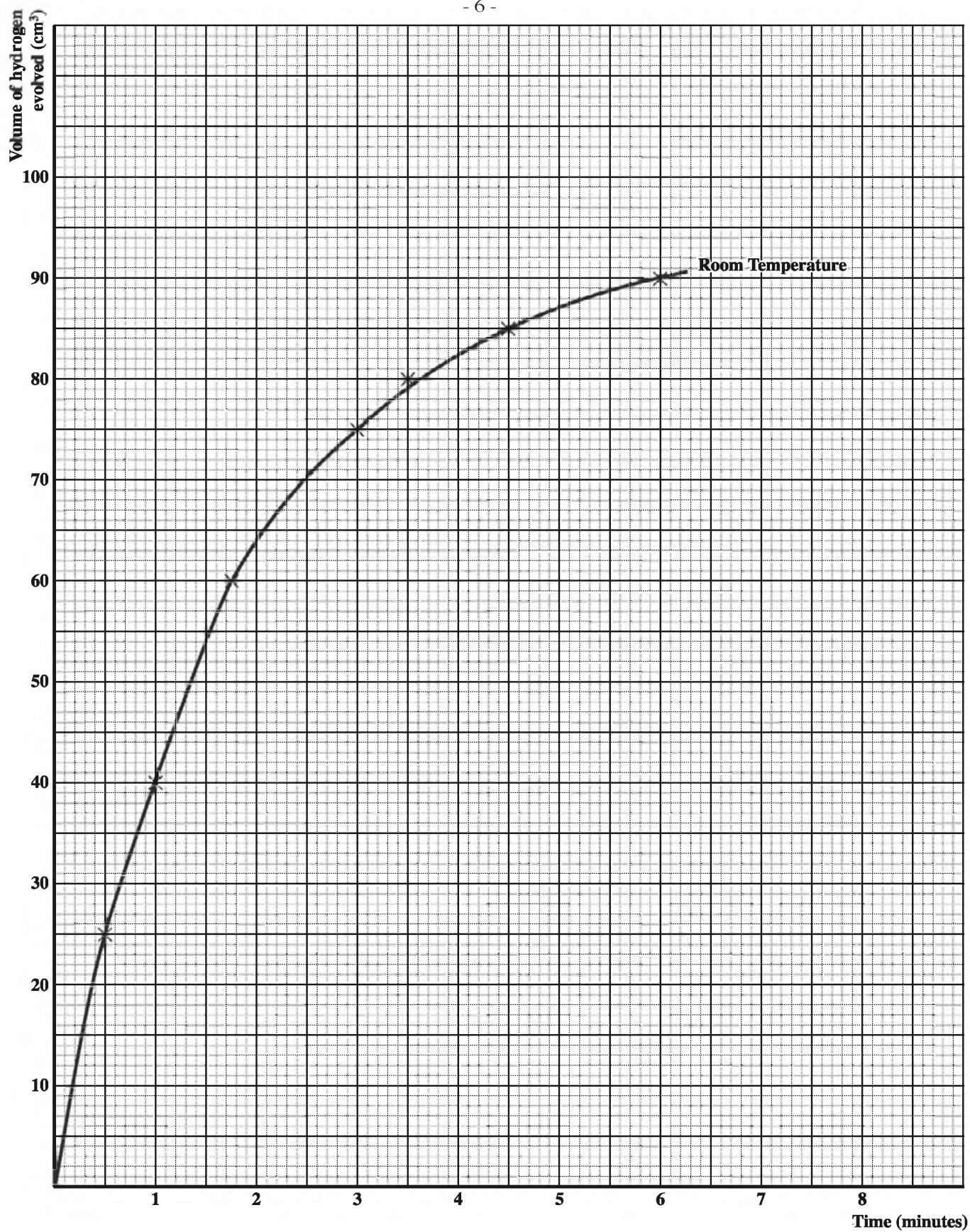
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[ 2 marks]

- (d) State the volume of hydrogen evolved in the reaction at 40 °C.

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[ 1 mark ]



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C

0 °C

[ 1 mark ]

20 °C

[ 1 mark ]

**Total 18 marks**

3. A

H

P

H

[ 1 mark ]

A

[ 2 marks ]

**P**

**[ 3 marks]**

**[ 1 mark ]**

**[ 2 marks]**

**[ 1 mark ]**



[ 1 mark ]

/

[ 1 mark ]

**Total 12 marks**

END OF TEST