TWENTY FIRST CENTURY
science

Module C6

CHEMICAL SYNTHESIS

Practice test

FOUNDATION

Name: .....

Form/teaching set: .....

Answer all of the questions.

Write your answers in the spaces provided on this paper.

You will need a copy of the Periodic Table for this test.

1 Finish the sentence. Choose the best word from the list.

fertilizers **hazards** **pharmaceuticals** **synthesis**

Many of the food additives, dyestuffs and paints that we use are made by chemical ……..... [1]

[Total marks: 1]

2 The table shows the names and formulae of some compounds.

name	**formula**
chlorine	Cl_2
……..……	H_2
nitrogen	……
……..……	NaCl
calcium carbonate	$CaCO_3$

Finish the table.

There are **three** spaces. [3]

[Total marks: 3]

3 What is the relative atomic mass of the element carbon?

Use your periodic table to help you.

……. [1]

[Total marks: 1]

4 The diagrams show some hazard symbols.

…… …… ……

Put the correct name under each symbol to show what it means. Choose from this list

corrosive **explosive** **harmful** **radioactive** **toxic**

[Total marks: 2]

5 A chemical company wishes to make some magnesium sulfate.

(a) The company has to follow several steps to make the magnesium sulfate.

These steps are shown below. They are in the wrong order.

Fill in the boxes below to show the correct order. One has been done for you.

A Carry out a risk assessment.

B Choose the reaction to use.

C Separate from unreacted chemicals to give impure magnesium sulfate

D Measure the final yield of magnesium sulfate.

E Purify the magnesium sulfate.

F Use the chosen reaction to make the magnesium sulfate.

B					

[4]

(b) The company used the reaction between magnesium oxide and sulfuric acid to make the magnesium sulfate.

The equation for this reaction is shown below.

$MgO + H_2SO_4 \rightarrow MgSO_4 + H_2O$

(i) Write down the name of one **reactant** in this reaction.

…… [1]

(ii) Write down the name of one **product** in this reaction.

…… [1]

(iii) The company expected to make 200 kg of magnesium sulfate by the method they used.

They only make 180 kg.

What is their percentage yield?

…… [1]

[Total marks: 7]

6 The apparatus shown in the diagram below is used in the analysis of chemicals.

…….. ……..

Label the two pieces of apparatus. Choose words from this list.

beaker **burette** **dessicator** **filter funnel** **titration flask** [2]

[Total marks: 2]

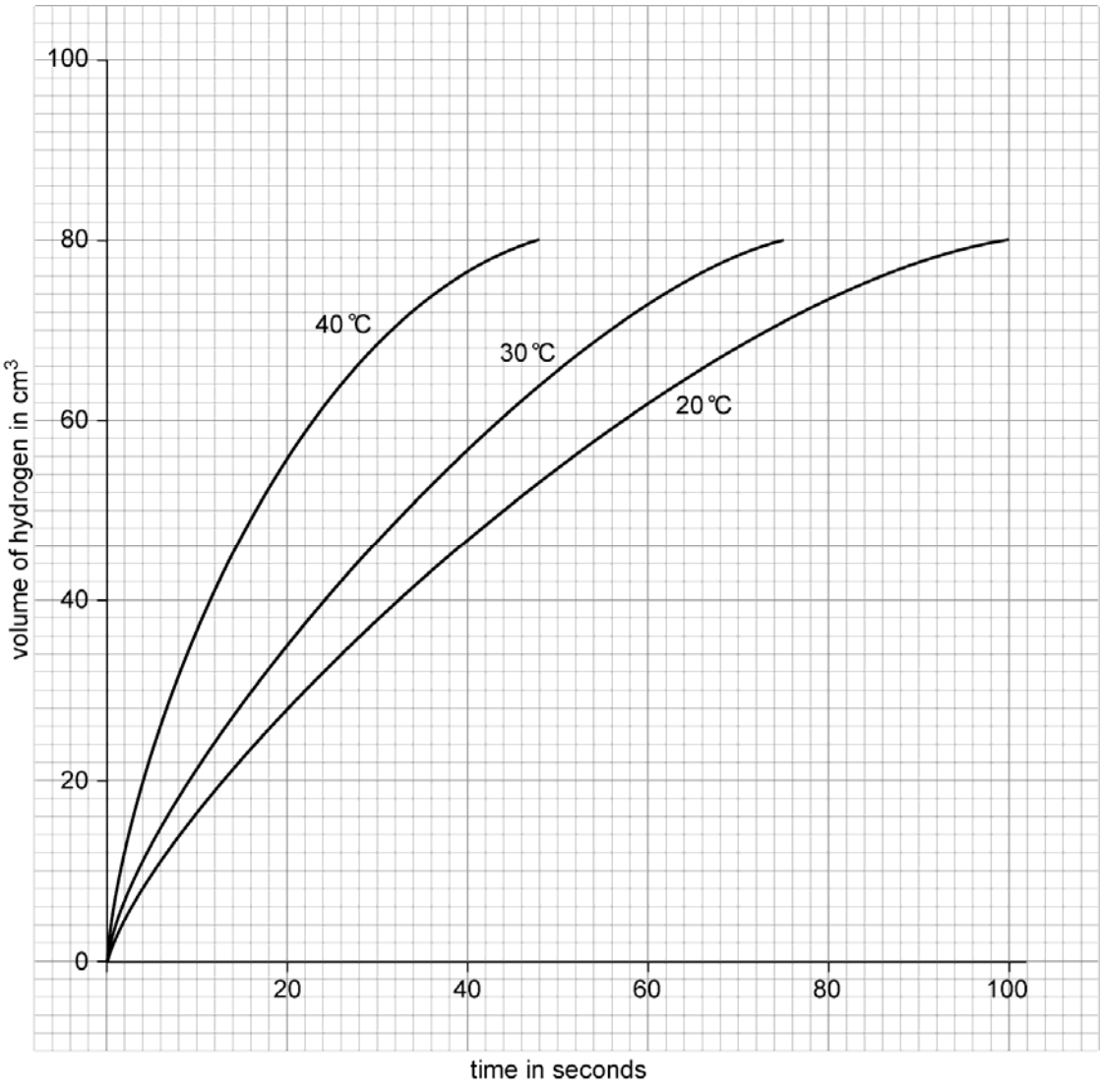
7 An experiment is carried out to find out how quickly magnesium reacts with sulfuric acid at different temperatures.

The equation for this reaction is shown below.

$Mg(s) + H_2SO_4(aq) \rightarrow MgSO_4(aq) + H_2(g)$

(a) The experiment is carried out at 20 °C, 30 °C and 40 °C.

The results of the experiments are shown in the graph below.



What does the information in the graph tell you about the effect of **temperature** on this reaction?

You should refer to the graph in your answer.

……

……

……

…… [2]

(b) Which one of the following methods was used to obtain the results shown in this graph?

Put a tick (✓) in the box next to the **one** correct answer.

measure the mass loss of a reactant	☐
measure the mass gain of a product	☐
measure the volume of a product	☐
measure the colour change of a reactant	☐

[1]

(c) Controlling the rates of chemical reactions is important in the chemical industry.

One reason is because of cost. Write down **one other** reason.

…… [1]

[Total marks: 4]

[Total marks for the test: 20]

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science

Module C6

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Practice test

HIGHER

Name: .....

Form/teaching set: .....

Answer all of the questions.

Write your answers in the spaces provided on this paper.

You will need a copy of the Periodic Table for this test.

1 An experiment is carried out to find out how quickly magnesium reacts with sulfuric acid at different temperatures.

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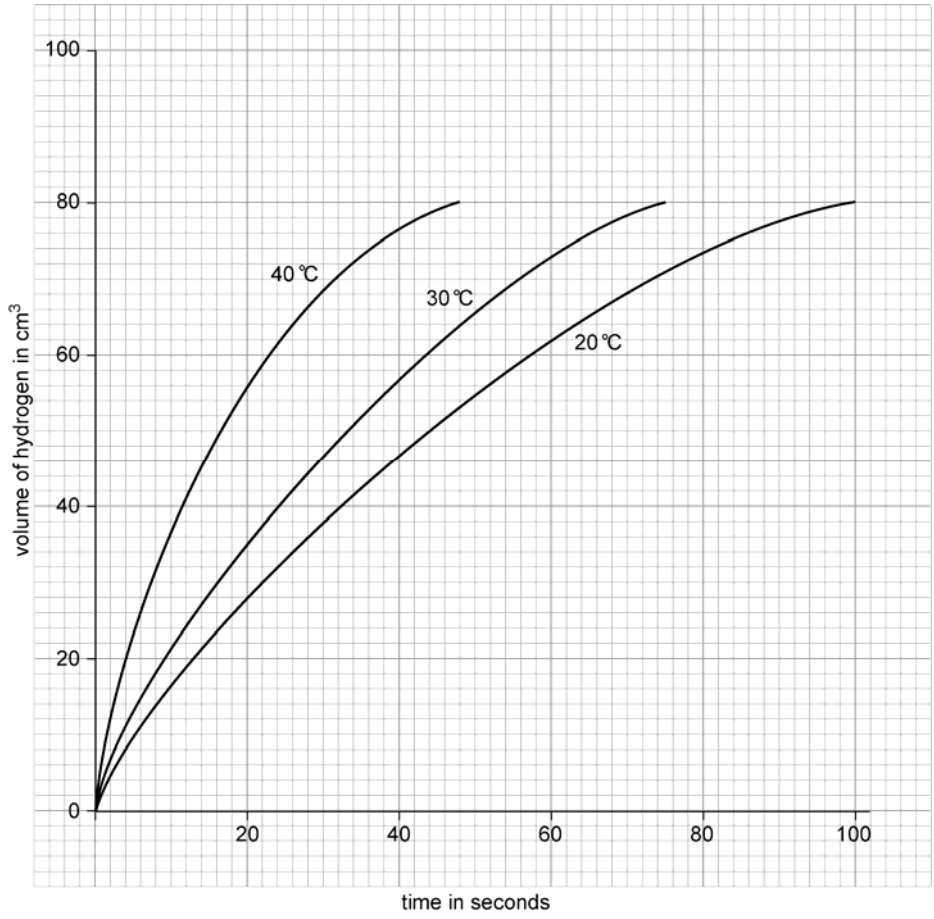

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……

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Put a tick (✓) in the box next to the **one** correct answer.

measure the mass loss of a reactant ☐

measure the mass gain of a product ☐

measure the volume of a product ☐

measure the colour change of a reactant ☐

[1]

(c) Controlling the rates of chemical reactions is important in the chemical industry.

One reason is because of cost. Write down **one other** reason.

…… [1]

(d) Changing the concentration of the sulfuric acid can change the rate of reaction between magnesium and sulfuric acid.

State and explain the effect of increasing the concentration of the sulfuric acid on the rate of this reaction.

You should refer to **particles** in your answer.

……

……

……

……

…… [3]

[Total marks: 7]

2 The table shows the names and formulae of some compounds.

name	**formula**
chlorine	Cl_2
sodium chloride	……
……	HNO_3
……	$MgCO_3$
calcium carbonate	$CaCO_3$

(a) Finish the table.

There are **three** spaces. [3]

(b) The symbol for a chloride ion is Cl^-.

What is the symbol for a calcium ion?

……[1]

[Total marks: 4]

3 What is the relative atomic mass of the element carbon?

Use your periodic table to help you.

……[1]

[Total marks: 1]

4 A chemical company wishes to make some magnesium sulfate.

The company used the reaction between magnesium oxide and sulfuric acid to make the magnesium sulfate.

The equation for this reaction is shown below.

$MgO + H_2SO_4 \rightarrow MgSO_4 + H_2O$

(a) The company wants to make 600 kg of magnesium sulfate.

How much magnesium oxide will they need to use?

Assume that all of the magnesium oxide reacts.

(Relative atomic masses: H = 1, O = 16, Mg = 24, S = 32)

…… kg [4]

(b) Although the company expected to make 600 kg of magnesium sulfate by their method, they only made 540 kg.

(i) What is their percentage yield?

…….. % [1]

(ii) Suggest one of the steps in the synthetic process that may have caused this loss of yield.

…….. [1]

[Total marks: 6]

5 The apparatus shown in the diagram below is used in the analysis of chemicals.

(a) What is the name of this piece of apparatus?

……. [1]

(b) The apparatus is used to find the concentration of some hydrochloric acid.

25 cm^3 of the hydrochloric acid is neutralised by 20 cm^3 of sodium hydroxide.

The sodium hydroxide has a concentration of 0.1 mol/dm^3 (1 dm^3 of solution contains 0.1 moles, where a mole is the relative formula mass in grams).

What is the concentration of the hydrochloric acid?
Use this formula to help you.

concentration of hydrochloric acid	×	volume of hydrochloric acid	=	concentration of sodium hydroxide	×	volume of sodium hydroxide

…… mol/dm^3 [1]

[Total marks: 2]

[Total marks for the test: 20]