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tutors**

Student number

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Name _____

Date _____

Attempt/Time taken _____

GCSE CHEMISTRY

Topic Paper: 4.2 Reactions of acids
Part 2

Time allowed: 30 minutes

Materials

For this paper you must have:

- the Periodic Table/Data Sheet, provided as an insert (enclosed)
- a ruler with millimetre measurements
- a calculator, which you are expected to use where appropriate.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- Do all rough work in this book. Cross through any work you do not want to be marked.

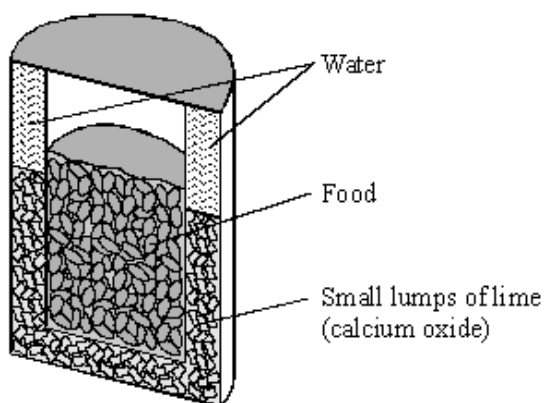
Information

- The Periodic Table/Data Sheet is provided as in insert.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions you need to make sure that your answer:
 - is clear, logical, sensibly structured
 - fully meets the requirements of the question
 - shows that each separate point or step supports the overall answer.



24 Marks

Q5. Mountaineers can warm their food in self-heating, sealed containers.



(a) The water is allowed to react with the lime. The heat from the reaction warms the food. What type of reaction causes a rise in temperature?

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(1)

(b) Some students investigated the effect of adding different sized lumps of lime to water. The results of their investigation are shown.

Time in minutes	Temperature in °C		
	Large lumps of lime	Small lumps of lime	Powdered lime
0	18	18	18
1	19	20	28
2	21	23	43
3	24	27	63
4	28	32	88
5	33	38	100

What do these results show? Give an explanation for your answer.

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(2)



(c) Suggest and explain **one** disadvantage of using powdered lime to heat food.

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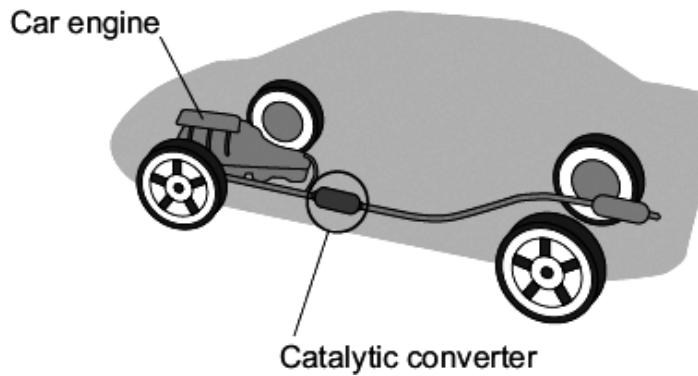
(2)
(Total 5 marks)

Q6. Read the information about car engines.

Burning petrol in air is an *exothermic* reaction. This reaction is used in car engines.

When petrol burns it produces harmful substances such as nitrogen oxides and carbon monoxide.

A catalytic converter stops these harmful substances being released into the air.



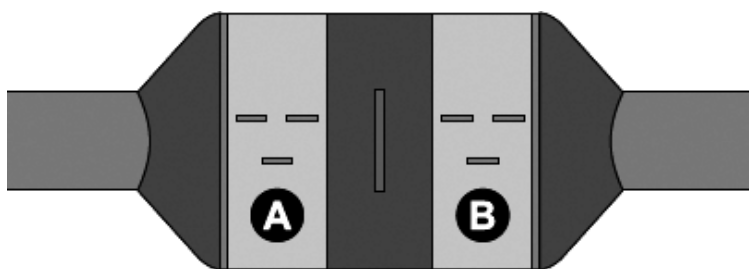
(a) The reaction is *exothermic*. What is the meaning of *exothermic*?

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(1)



(b) The catalytic converter has two parts shown as **A** and **B** in the diagram.



Part **A** contains a catalyst made from platinum and rhodium.

Part **B** contains a catalyst made from platinum and palladium.

(i) Why are catalysts used in chemical reactions?

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(1)

(ii) One reaction in part **A** is shown by this equation.



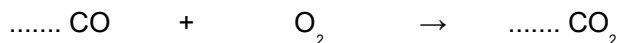
Suggest why this reaction helps the environment.

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(1)

(iii) The equation for one of the reactions in part **B** is shown below.

Balance this equation.



(1)

(iv) The catalytic converter works for many years without replacing the catalyst.

Explain why the catalyst does not need to be replaced.

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(1)

(v) Suggest why different catalysts are used in parts **A** and **B**.

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(1)



- (c) Modern catalytic converters contain nanosized particles of catalyst. Using nanosized particles reduces the cost of the catalytic converter.

Suggest and explain why the use of nanosized catalyst particles reduces the cost of the catalytic converter.

Your answer should include information about the size and surface area of the particles.

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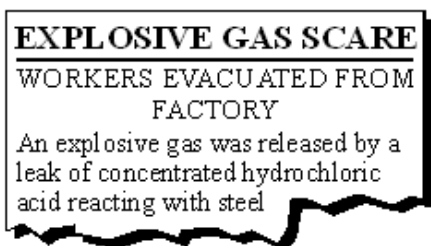
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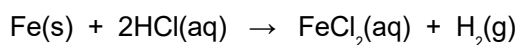
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(3)
(Total 9 marks)

Q7. This article appeared in a newspaper.



- (a) The balanced chemical equation shows the reaction between steel and hydrochloric acid.



- (i) Which metal in steel reacted with the hydrochloric acid?

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(1)

- (ii) The gas released was described as explosive. Explain why.

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(3)



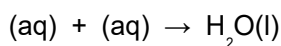
(b) In the factory hydrogen chloride is manufactured by reacting hydrogen with chlorine. Hydrochloric acid is formed when hydrogen chloride forms a solution in water.

(i) Water was sprayed on the steel and hydrochloric acid. This slowed the rate of reaction. Explain why.

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(2)

(ii) It would have been better to neutralise the acid with an alkali rather than to just add water. Hydrochloric acid can be neutralised by reaction with sodium hydroxide. Complete the ionic equation for the neutralisation reaction.



(2)

(iii) In the factory the acid leak was neutralised with slaked lime, $\text{Ca}(\text{OH})_2$, and not sodium hydroxide, NaOH . Suggest why.

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(2)

(Total 10 marks)