

Name:

Edexcel Style

Combined Science GCSE

Rates of Reaction and Energy Changes Test

(Levels 4–9)

Date:

Time Allowed: 50mins

Question	Links to Student Progress Sheet	Score	Total Marks Available
1	7.1, 7.2, 7.4, 7.6, 7.8		15
2	7.10, 7.11, 7.12, 7.14, 7.15, 7.16		10
3	7.9, 7.11, 7.13		10
4	7.1, 7.2, 7.3		8
5	7.9		7
Total			50

Score	Estimated Grade
47 – 50	9
40 – 46	8
33 – 39	7
28 – 32	6
24 – 27	5
20 – 23	4
0 – 19	U

Please be aware that these grade boundaries are Twinkl's own, and may not be in-line with Edexcel's own.

Area for Improvement:

1. (a) A student was investigating rates of reaction and produced carbon dioxide using marble chips and hydrochloric acid.

Which one of these would increase the rate of reaction?

(1)

- ☐ **A** Use a greater volume of hydrochloric acid.
- ☐ **B** Use a more concentrated solution of hydrochloric acid.
- ☐ **C** Use sulfuric acid.
- ☐ **D** Use larger pieces of marble.

- (b) (i) If the temperature was increased, what would happen to the rate of reaction?

(1)

(ii) Explain your answer to part (i).

(2)

- (c) Changing the size of the marble will change the rate of reaction with hydrochloric acid.

Describe an experiment to investigate this and explain: what would happen if the marble chips used were smaller and how this would change the rate of reaction?

(6)

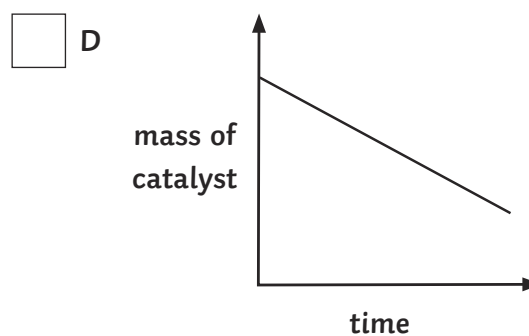
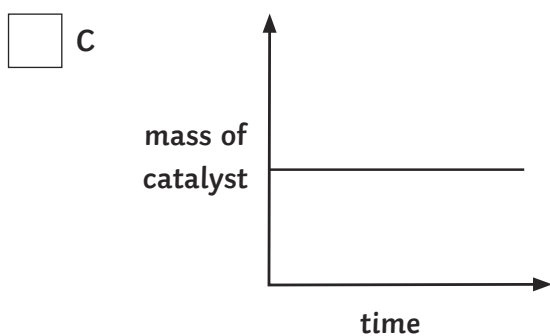
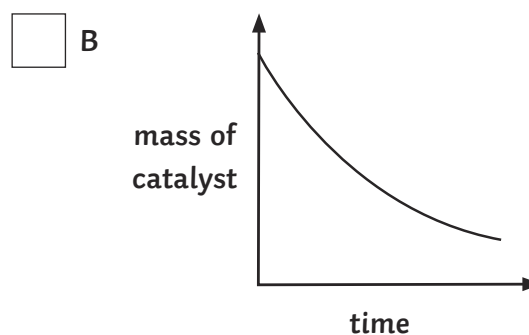
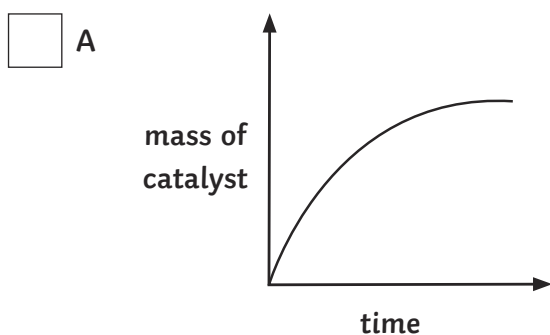
(d) (i) Sometimes a catalyst is used in such reactions.

Explain what a catalyst does.

(2)

(ii) When a catalyst is used in the decomposition of hydrogen peroxide using manganese (iv) oxide, what would a graph look like to show the mass of the catalyst during the reaction?

(1)



(e) (i) What is an enzyme?

(1)

(ii) Where can enzymes be used in industry?

(1)

(Total for Question 1 = 15 marks)

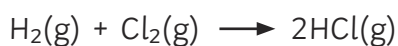
2. (a) Some reactions are exothermic. Explain in terms of making and breaking bonds why a reaction can be exothermic.

(2)

- (b) (i) The table below shows the energies of some bonds:

Bond	Bond energy/kJ mol ⁻¹
H-Cl	432
Cl-Cl	243
H-H	436

If the reaction of hydrogen with chlorine produces hydrogen chloride:



Calculate the change in energy when 1 mol hydrogen gas is reacted with 1 mol of chlorine gas to form 2 mol of hydrogen chloride gas.

(4)

Energy change = _____ kJ mol⁻¹

(ii) This reaction is exothermic.

Draw and label the reaction profile diagram for the above reaction.

Identify on the diagram the activation energy.

(3)



(iii) What is the activation energy?

(1)

(Total for Question 2 = 10 marks)

3. (a) A student was mixing chemicals in a lab and measuring the temperature changes she saw. She mixed ethanoic acid with sodium carbonate and the temperature dropped. What type of reaction is this?

(1)

- (b) Which of the following is not an exothermic reaction?

(1)

- ☐ A burning
- ☐ B neutralisation
- ☐ C reacting water and calcium oxide
- ☐ D electrolysis

- (c) Complete the following by inserting a word from the box below.

Each word can only be used once.

(3)

If forming bonds releases _____ heat than is needed to break bonds, a reaction is _____, so energy is _____.

taken in	given off	more	less	endothermic	exothermic
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- (d) A student set up an endothermic experiment: he added water to a beaker, took a temperature reading and left the thermometer in the beaker. He added some ammonium nitrate crystals and stirred the mixture.

Describe what he would see.

(2)

(e) Complete the following table using the words endothermic or exothermic.

(3)

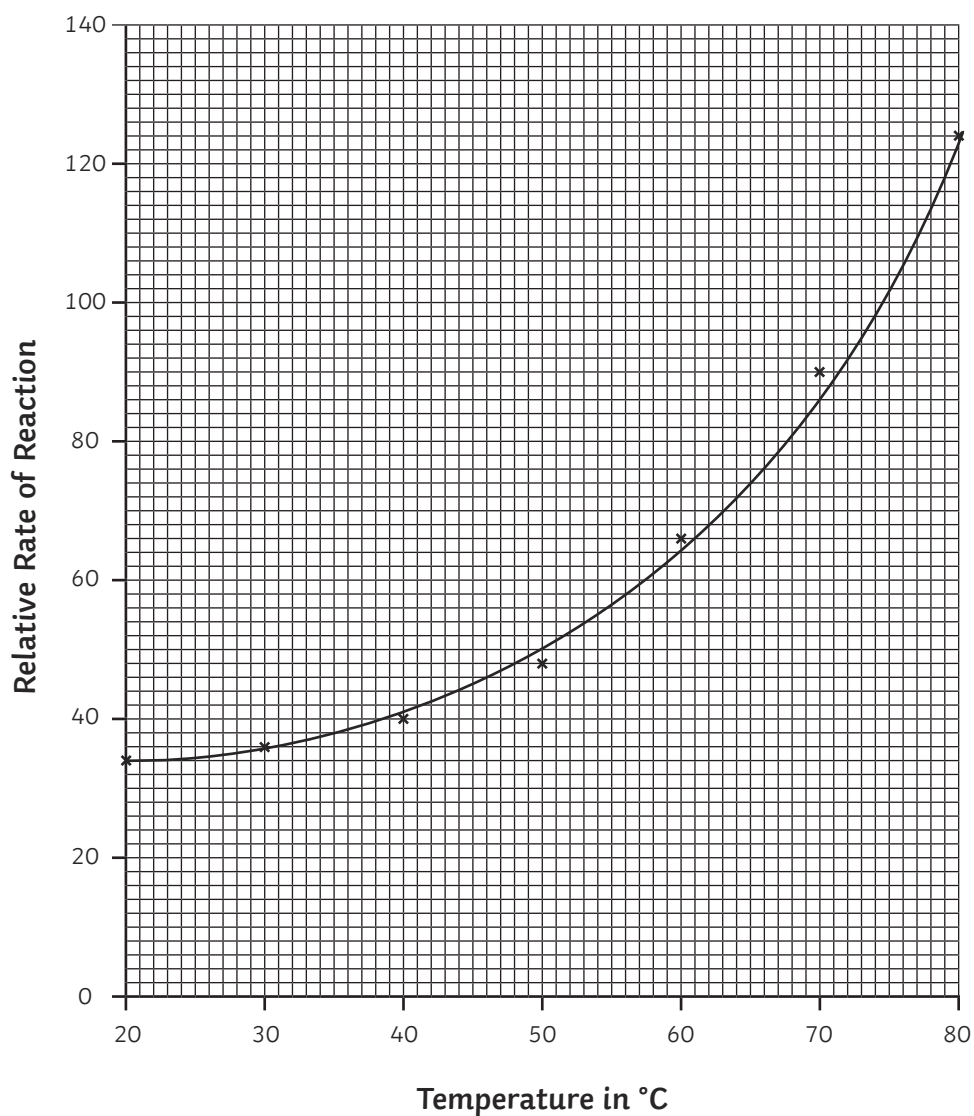
Reaction	Initial Temperature °C	Final Temperature °C	Reaction Type
A	16	10	
B	17	24	
C	18	27	

(Total for Question 3 = 10 marks)

The experiment was carried out again but the temperature was changed.

The results were plotted on a graph as shown below:

Figure 2



(b) Describe what the graph shows.

(2)

- (c) The student made a conclusion about the graph stating: '...the rate of reaction doubles as the concentration of sodium thiosulfate doubles...'

Explain what this means in terms of particles.

(Total for Question 4 = 8 marks)

5. (a) (i) Students mixed together lead nitrate with potassium iodide solution and a solid was produced.

What is the name of this type of reaction?

(1)

- ☐ A combustion
- ☐ B precipitation
- ☐ C neutralisation
- ☐ D evaporation

- (ii) The following is the equation for this reaction. Write in the missing state symbols for the reactant and the product.

(2)



- (iii) Complete the word equation for the reaction.

(2)

lead nitrate + _____ lead iodide + _____

- (b) (i) How could this solid be separated from the liquid?

(1)

- (ii) What apparatus could you use to separate the solid from the liquid?

(1)

(Total for Question 5 = 7 marks)

TOTAL FOR PAPER = 50 MARKS