

# Rate of Reaction

## Mark Scheme 1

<b>Level</b>	GCSE (9-1)
<b>Subject</b>	Combined Science: Trilogy - Chemistry
<b>Exam Board</b>	AQA
<b>Topic</b>	5.6 Rate + Extent Chemical Change
<b>Sub-Topic</b>	Rate of Reaction
<b>Difficulty Level</b>	Bronze Level
<b>Booklet</b>	Mark Scheme 1

**Time Allowed:** 59 minutes

**Score:** /59

**Percentage:** /100

**Grade Boundaries:**

- M1.(a)** (i) oxygen, sulfur trioxide  
*both needed for mark* 1
- (ii) compound 1
- (b) increases  
*accept (goes) higher / (goes) up / (is) faster / (are) more frequent* 1
- (c) activation 1
- (d) catalyst **or** increase temperature 1
- [5]**
- 
- M2.(a)** would melt  
*accept they have a low melting point  
allow lose their shape  
ignore would soften when hot  
ignore boiling point* 1
- (b) to speed up the reaction  
*accept can use a lower temperature  
accept less energy needed* 1
- (c) (i) mass spectrometer  
*allow mass spectroscopy* 1
- (ii) any **one** from:  
*ignore reliable  
ignore more precise*

- accurate
- sensitive
- rapid / quicker
- small amount of sample

1

(d) any **two** from:

*allow concentration*

- pressure
- temperature
- catalyst **or** initiator
- solvent

2

[6]

**M3.(a)** heat / energy

1

given out / transfers to surroundings

*the mark for given out / transfers to cannot be awarded  
without heat / energy*

*allow given off*

1

(b) (i) decreases

1

increases

1

(ii) it gives the particles more energy

1

it makes the particles move faster

1

[6]

**M4.** (a) oxygen **and** water

*both needed for mark*

*allow hydrogen oxide for water*

*in any order*

*ignore formulae*

1

(b) (i) best fit line, omitting point at 10s

*straight line drawn through all correct points*

1

(ii) circle around point at 10 s

*allow any indication*

1

(iii) 7.5

*allow ecf from candidate's line*

1

(iv) increases (with time)

*accept goes from 0 to 12.5*

1

(c) (i) higher

1

(ii) more concentrated

1

(d) (i) share 1

(ii) covalent 1

(iii) simple molecules 1

(e) Water has a boiling point of 100°C 1

Water has a melting point lower than room temperature 1

[12]

**M5.** (a) (i) the temperature at start  
*ignore reference to bubbles / heat* 1

the temperature at end  
*(measure) the temperature rise / change = 2 marks*  
*(measure) the temperature 1 mark* 1

(ii) temperature would increase  
*allow it gets hot(ter) / warm(er) or heat given off*  
*allow energy released / transferred* 1

(b) any **one** from:

- volume of acid  
*allow amount*  
*allow liquid*
- temperature of acid
- size of magnesium ribbon  
*allow volume / mass / amount*
- surface area of magnesium  
*ignore size of test tube and reference to water*

1

(c) (i) (Test tube) B

1

(ii) produces bubbles faster  
*accept more bubbles*

**or**  
faster rate of reaction  
*allow most reactive*

1

(d) The particles move faster

1

The particles collide more often

1

[8]

**M6.** use a more concentrated solution of sulfuric acid

1

grind the phosphate rock into a powder before adding the acid

1

increase the temperature of the sulfuric acid

1

[3]

M7. (a) goes up

1

(b) (i) B

1

(ii) A

1

(iii) a catalyst

1

activation energy

1

(c) (i) eg (ensures) complete reaction  
*allow spread heat / energy*

**or** even heating

*allow mixes properly or mix them together or to get correct temperature*

*ignore dissolves*

1

(ii) lid (on beaker)  
*accept cover beaker*

**or**

insulate (beaker) / use a plastic cup

1

[7]

M8. (a) (i) mix (owtte)

*accept to allow more collisions / helps particles to collide (owtte)*

*idea of more efficient heat transfer*

*do **not** allow heat is a catalyst*

1

(ii) higher **and** more

1

powder **and** big

1

concentrated **and** more

1

(b) electrons

1

(c)  $H^+$

1

[6]

M9. (a) the glow stick is brighter (owtte)

*accept glow stick is less bright **at low temperatures** (owtte)*

*ignore references to rate / particles*

1



- (b) gave out light for less time  
*accept use of figures from table for comparison*  
*allow reference to speed / rate eg quicker / faster reaction* 1
- (c) the particles will collide more often 1
- the particles will move faster 1
- the particles will have more energy 1
- (d) any **one** from:  
repeat  
*allow more glow sticks*  
measure brightness eg use light meter  
more temperatures **or** wider range  
improve precision 1

[6]