

**QUESTIONSHEET 1**

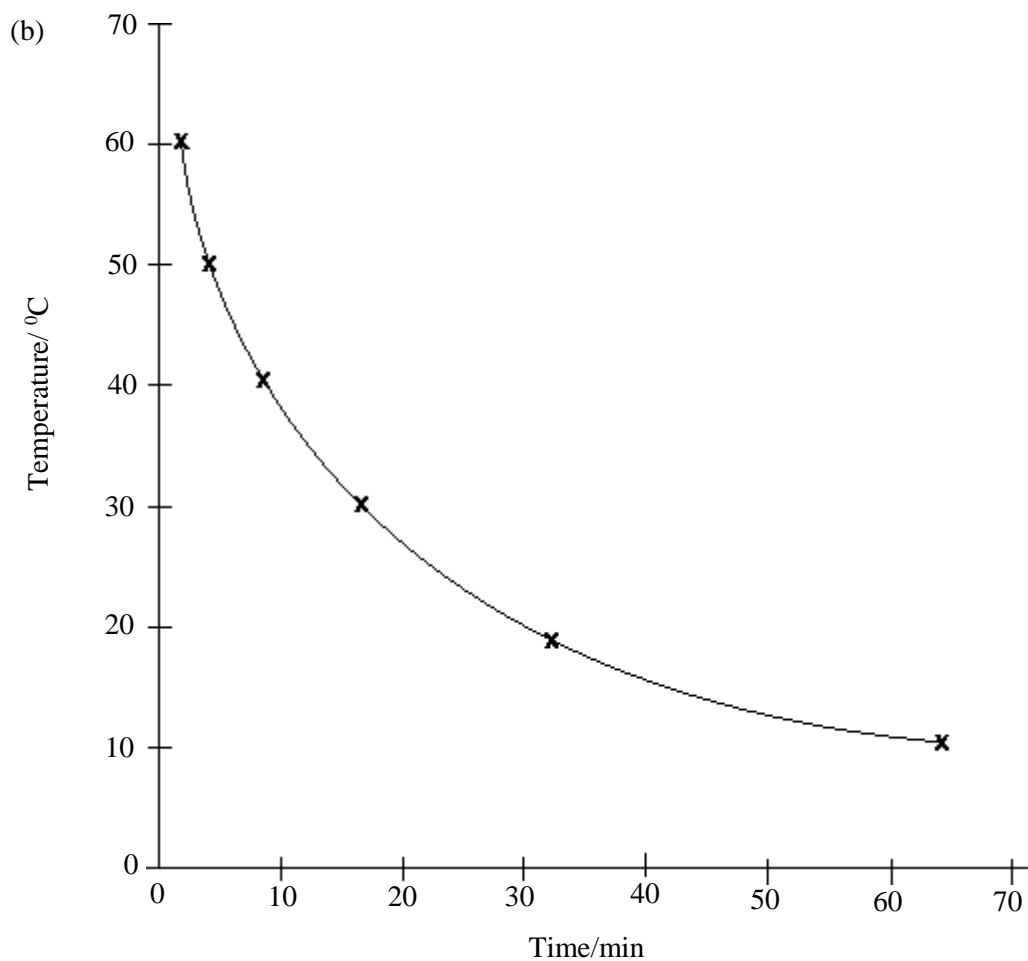
(i)	scales	1
	plotting all the points accurately	1
	drawing a smooth curve ignoring the 6 min point	1
(ii)	I curve drawn to the left of curve A	1
	curve to start at 71.00 g and to finish at 70.20 g	1
	II curve drawn to the right of curve A	1
	curve to start at 71.00 g and to finish at 70.60 g	1
(iii)	particles have more energy	1
	greater chance of successful collision	1
	therefore greater rate of reaction	1

**TOTAL 10**

**QUESTIONSHEET 2**

- (a) halve time three times  
4 mins

1  
1



sensible scales  
correct plotting  
correct line drawn

1  
1  
1

- (c) impossible to have reaction in zero time  
too cold and reaction will stop

1  
1

**TOTAL 7**

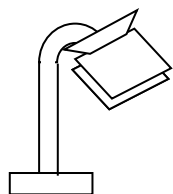
## QUESTIONSHEET 3

- (a) (i) All state symbols correct:  
 $\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$  1
- (ii) calcium chloride 1
- (iii)  $40 + 12 + (3 \times 16) = 100$  1
- (iv) **A** Idea that 1 mole / 1 molecule of  $\text{CaCO}_3$  produces 1 mole / molecule of  $\text{CO}_2$   
 mass of 1 mole of  $\text{CO}_2 = 44 \text{ g}$  1  
**B**  $0.44 \text{ g} / 1\%$  of candidate's answer to **A** 1
- (b) (i) would know how much  $\text{CO}_2$  could be produced 1  
 if very different result obtained, could indicate error/could be used to monitor  
 reliability of technique 1
- (ii) in method A, some  $\text{CO}_2$  would escape before apparatus was placed on balance/  
 before initial reading could be taken 1  
 would lead to underestimate of  $\text{CO}_2$  produced 1

**TOTAL 10**

## QUESTIONSHEET 4

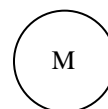
- (a) sulphur is produced 1  
 clouds up the beaker/ sulphur is insoluble 1
- (b) (i) 9Z 1  
 (ii) 9X 1  
 (iii) 9Y 1
- (c) (i) St Paul's 1  
 (ii) concentration affects rate of reaction 1  
 St Paul's is fastest 1
- (d) shine lamp through beaker 1  
 set photocell on other side 1  
 time how long it takes for motor to stop 1



uv lamp



photo cell



motor

1

**TOTAL 12**

**QUESTIONSHEET 5**

- (a) (i) a substance which speeds up a reaction 1  
but is not used up/ still present at the end of the reaction 1
- (ii) enzymes 1
- (b) (i) sample at 80°C 1
- (ii) enzyme denatured at 80°C 1  
leaving the reaction without a catalyst 1  
so very slow 1
- (iii) sample at 40°C 1
- (iv) reaction is fastest at this temperature/ reaction is slower at lower temperatures 1  
most starch digested 1
- (v) iodine 1

**TOTAL 11****QUESTIONSHEET 6**

- (a) fizzes / bubbles/ gradually disappears 1
- (b)  $\frac{40\text{cm}^3}{10\text{s}} = 4\text{ cm}^3\text{ s}^{-1}$  1
- (c) much slower 1  
fewer particles, so fewer collisions 1
- (d) increase temperature / heat it 1  
change surface area of magnesium → powder 1
- (e) moles of hydrogen =  $\frac{40}{24,000}$  1  
=  $1.67 \times 10^{-3}$  1

**TOTAL 8**

**QUESTIONSHEET 7**

(a)	yellow precipitate/ goes cloudy	1
(b)	sodium chloride, water, sulphur dioxide (any 2)	2
(c)	increase concentration of either reactant more particles closer together/ more collisions	1 1
(d) (i)	plot of either volume of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> or water v time points plotted smooth curve	1 1 1
(ii)	concentration	1
(iii)	to keep concentration of acid constant	1
(iv)	goes cloudy/ solid forms	1

**TOTAL 11****QUESTIONSHEET 8**

(a)	add universal indicator solution/paper/test with pH meter universal indicator turns orange/pink/pH falls	1 1
(b)	the amount/mass of lactic acid produced in 1 second/specified time	1 1
(c)	bacteria produce an enzyme/biological catalyst	1
(d)	statements or diagrams showing: lactose molecules colliding with enzyme molecules lactose and enzyme molecules bonded together lactic acid molecules released from enzyme molecules	1 1 1
(e)	the concentration of lactose decreases/ the lactic acid destroy the enzyme/kills the bacteria	1
(f)	the rate of reaction decreases because the high temperature destroys the enzyme/kills the bacteria	1 1

**TOTAL 11**

**QUESTIONSHEET 9**

- |     |                                      |   |
|-----|--------------------------------------|---|
| (a) | axes labelled                        | 1 |
|     | points plotted                       | 1 |
|     | smooth curve                         | 1 |
| (b) | (i) take value from graph (about 21) | 1 |
|     | (ii) reaction is so fast             | 1 |
| (c) | (i) hydrogen                         | 1 |
|     | (ii) 'pops' with lighted splint      | 2 |

**TOTAL 8****QUESTIONSHEET 10**

- |     |   |             |
|-----|---|-------------|
| (a) | (i) creates larger surface area of catalyst   | 1           |
|     | (ii) rate of reaction increases<br>as temperature rises   | 1<br>1      |
| (b) | (i) reactants stick to surface of catalyst<br>products separate from catalyst after reaction<br>heavy metals block surface to reactants | 1<br>1<br>1 |
|     | (ii) lead is a heavy metal<br>would ruin catalyst   | 1<br>1      |

**TOTAL 8****QUESTIONSHEET 11**

- |     |   |        |
|-----|---|--------|
| (a) | $2\text{H}_2\text{O}(l) \rightarrow 2\text{H}_2\text{O}(l) + \text{O}_2(g)$ |        |
|     | formulae correct  | 1      |
|     | balancing   | 1      |
| (b) | (i) manganese(IV) oxide / manganese dioxide                                 | 1      |
|     | (ii) lowers activation energy<br>provides surface for reaction              | 1<br>1 |
|     | (iii) weigh before and after<br>then test its catalysing properties again   | 1<br>1 |

**TOTAL 7**

**QUESTIONSHEET 12**

- (a) measure loss of mass as gas lost over a period of time 1  
1
- (b) (i) hydrogen 1  
(ii) lighted splint produces pop / explosion 1  
1
- (iii)  $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$  2  
(formulae – 1, balancing – 1)
- (c) (i) rate increased/faster 1  
(ii) rate increased/faster 1  
(iii) rate increased/faster 1

**TOTAL 10****QUESTIONSHEET 13**

- (a) pressure forces gases into smaller space molecules more likely to collide 1  
1
- (b) large surface area of powder can create explosions when it burns/ causes very rapid combustion 1  
1
- (c) in less than one minute/faster than ribbon 1
- (d) heat gives molecules more energy collisions more likely to produce reaction 1  
1
- (e) cooling slows down reactions but does not stop them 1  
1

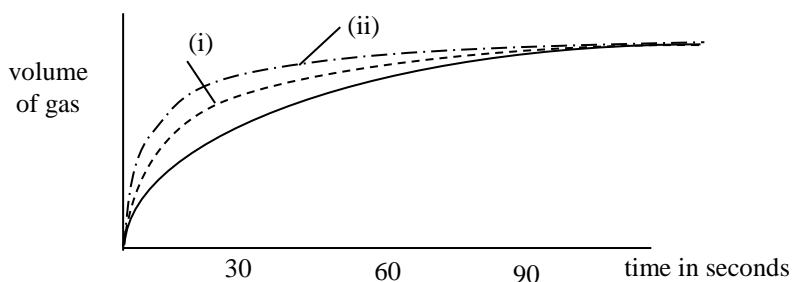
**TOTAL 9****QUESTIONSHEET 14**

- (a) CO = carbon monoxide 1  
NO<sub>x</sub> = oxides of nitrogen 1  
CH = hydrocarbons 1
- (b) (i) C 1  
(ii) carbon monoxide 1  
(iii) oxides of nitrogen 1

**TOTAL 6**

**QUESTIONSHEET 15**

- (a) (i) steeper line 1  
same volume of oxygen 1
- (ii) much steeper line 1  
same volume of oxygen 1



- (b) more gas produced with Y 1  
catalyst does not affect outcome of reactions 1
- (c) some Y used up 1  
catalysts are not used up 1

**TOTAL 8****QUESTIONSHEET 16**

- (a)  $\text{H}_2\text{O}_2$  1
- (b) oxygen 1
- (c) (i) substance which speeds up a reaction 1  
but does not get permanently used up/ can be recovered unchanged at the end 1
- (ii) A 1  
does not change speed/rate 1
- (iii) C 1  
changes speed the most 1
- (d) 5 g 1

**TOTAL 9**



**QUESTIONSHEET 17**

- (a) Three from:  
add catalyst  
heat/warm reaction  
use higher concentration of reactants  
use solid reactants with greater surface area / stir more  
increase pressure of gaseous reactants 3
- (b) not enough activation energy supplied by a match 1  
heat from the match is conducted away by the rest of the tree 1
- (c) dust has greater surface area 1  
burns more easily 1
- TOTAL 7**

**QUESTIONSHEET 18**

- (a) (i) D 1  
(ii) B 1
- (b) (i) 60 cm<sup>3</sup> 1  
(ii) 20 s 1
- (c) 66 cm<sup>3</sup> 1
- (d) (i) 66 cm<sup>3</sup> 1  
(ii) the same 1
- TOTAL 7**

**QUESTIONSHEET 19**

- (a) Two from:  
(gas) syringe, measuring cylinder, burette 2
- (b) (i) Three from:  
use same sized pieces of magnesium/ use same mass of magnesium  
use same volume of acid  
keep temperature the same  
stir the same amount 3
- (ii) stop clock 1
- (c) balance reading to 2 decimal places 1
- TOTAL 7**

***QUESTIONSHEET 20***

One mark for each of the following (in correct order)

- |        |                     |   |
|--------|---------------------|---|
| (i)    | joules              | 1 |
| (ii)   | kilojoule           | 1 |
| (iii)  | exothermic          | 1 |
| (iv)   | endothermic         | 1 |
| (v)    | catalyst            | 1 |
| (vi)   | increased           | 1 |
| (vii)  | surface area        | 1 |
| (viii) | photography/sunburn | 1 |
| (ix)   | light               | 1 |

**TOTAL 9**