

QUESTIONSHEET 1

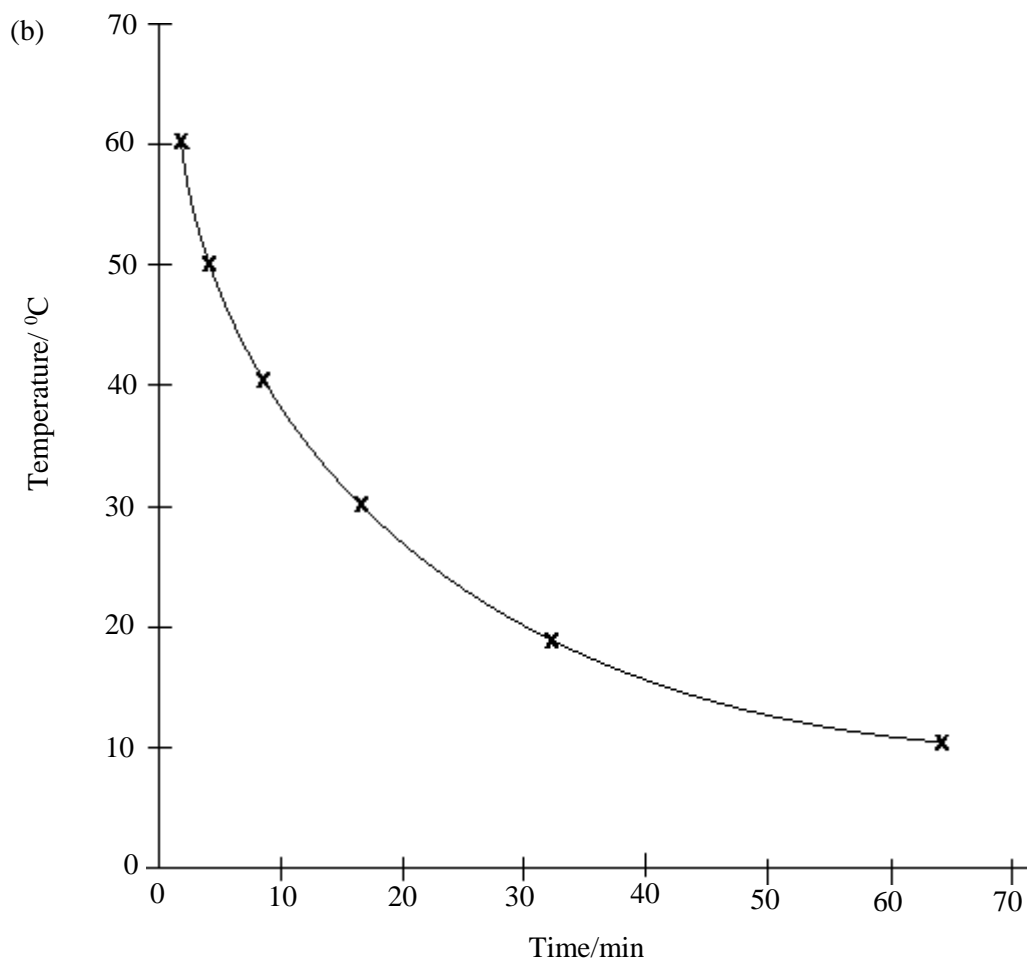
(i)	scales	1
	plotting all the points accurately	1
	drawing a smooth curve ignoring the 6 min point	1
(ii)	I curve drawn to the left of curve A	1
	curve to start at 71.00 g and to finish at 70.20 g	1
	II curve drawn to the right of curve A	1
	curve to start at 71.00 g and to finish at 70.60 g	1
(iii)	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

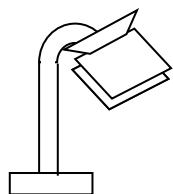
QUESTIONSHEET 3

- (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 CaCO_3 produces 1 mole / molecule of 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 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 CO_2 would escape before apparatus was placed on balance/
 before initial reading could be taken 1
 would lead to underestimate of 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

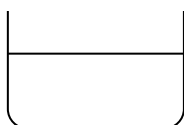
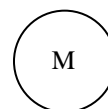


photo cell



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
= 1.67×10^{-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 ₂ S ₂ O ₃ 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
as temperature rises | 1
1 |
| (b) | (i) reactants stick to surface of catalyst
products separate from catalyst after reaction
heavy metals block surface to reactants | 1
1
1 |
| | (ii) lead is a heavy metal
would ruin catalyst | 1
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
provides surface for reaction | 1
1 |
| | (iii) weigh before and after
then test its catalysing properties again | 1
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) $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$
(formulae – 1, balancing – 1) | 2 |
| (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 |

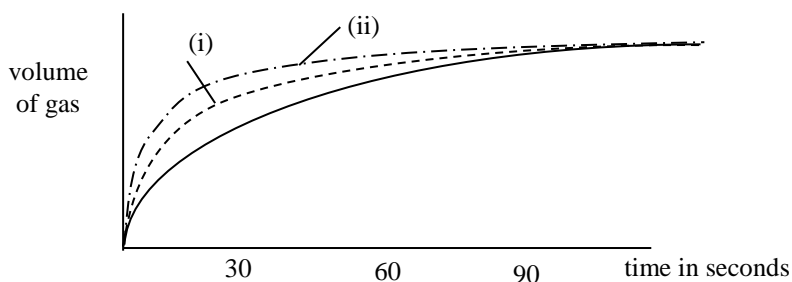
TOTAL 9**QUESTIONSHEET 14**

- | | | |
|-----|--------------------------------------|---|
| (a) | CO = carbon monoxide | 1 |
| | NO _x = 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) H_2O_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 cm³ 1
(ii) 20 s 1
- (c) 66 cm³ 1
- (d) (i) 66 cm³ 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