Mark schemes

Q1.

(a) limestone

1

sodium carbonate

1

(b) (advantage) stronger

1

(reason) less easily damaged

1

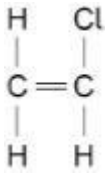
(c) (advantage) lower density

1

(reason) lighter (to install)

1

(d)



1

(e) (add damp) litmus paper

1

(litmus paper) is bleached
or
(litmus paper) turns white
ignore (litmus paper) turns red

1

(f) (polymers)
last a long time
ignore references to cost
allow break down slowly

1

(wood)
renewable
allow trees can be replanted
allow aesthetic reasons

1

(g) (percentage of aluminium =)

$$\frac{5.94}{6.00} \times 100$$

1

= 99 (%)

1

(h) (alloy is) harder (than pure aluminium)

allow (alloy is) stronger (than pure aluminium)

ignore references to cost

1

[14]

Q2.

(a) measuring cylinder

allow pipette / burette

1

(b) limewater turns milky

1

(c) all six points plotted correctly

allow a tolerance of ± ½ a small square

*allow **1** mark for four or five points plotted correctly*

2

line of best fit

1

(d) (volume =) 48 (cm^3)

1

(rate=) $\frac{48}{60}$

allow correct use of an incorrectly determined value for volume

1

= 0.8 (cm^3/s)

1

(e) (between 0 and 20 seconds) (volume of gas) increases

1

(between 80 and 100 seconds) no change (in volume of gas)

allow reaction stops

1

(f) systematic error

1

(g) (area of one face = 2 x 2 =) 4 (mm^2)

1

(total surface area =) 4 x 6

allow correct use of an incorrectly

calculated area of one face

1

= 24 (mm^2)

1

(h) faster

1

[15]

Q3.

(a) **test:** (use a) glowing splint

*do **not** accept burning splint*

1

result: relights

dependent on correct test in MP1
ignore with a pop

1

(b) starch

1

cellulose

allow glycogen

1

(c) 2

1

(d) water

allow H_2O

1

(e) ammonia

1

nitrogen

*if no other mark awarded, allow **1** mark for NO / NO_2 / N_2O / NO_x or equivalent named compounds*

1

(f) two polymer chains

allow two polymer strands

1

four (different) monomers / nucleotides

allow four (different) bases
allow cytosine, guanine, adenine and thymine
allow C G A T

1

(double) helix

allow spiral

*if no other mark awarded, allow **1** mark for DNA*

1

[11]

Q4.

(a) a glowing splint

1

(b) student **A** should measure the mass of manganese dioxide.

1

(c) calculate a mean but do not include any anomalous results.

1

(d)

*an answer of 0.173 (cm^3/s) scores **4** marks*

(volume of oxygen formed =)
(58 - 20 =) 38 (cm^3)

allow values between 36 (cm^3) and 40 (cm^3) inclusive

1

(time taken = 250 – 30 =) 220 (s)

1

$\frac{38}{220}$ **or** 0.1727 (cm^3/s)

allow a correct calculation using an incorrectly determined value for volume and / or time

1

= 0.173 (cm^3/s)

allow a correctly calculated answer given to 3 significant figures from an incorrect attempt at the rate equation

1

(e) line starts at the origin **and** steeper than existing line

1

final volume same as existing line

allow a tolerance of ± ½ a small square

1

(f) fine manganese dioxide powder has a larger surface area

1

[10]

Q5.

(a) glowing splint

*do **not** accept burning splint*

1

(which) relights

dependent on correct test in MP1
ignore with a pop

1

(b) place the conical flask in a water bath at constant temperature.

1

use a mass of 1 g manganese dioxide each time.

1

(c)

*an answer of 0.092 (cm^3/s) scores **3** marks*
*allow an answer of 0.091666 (cm^3/s) correctly rounded to at least 2 significant figures for **2** marks*
*allow an answer of 0.033 (cm^3/s) for **2** marks*
*allow an answer of 0.033333 (cm^3/s) for **1** mark*

11 (cm^3) **and** 120 (seconds)

1

(mean rate of reaction = $\frac{11}{120}$)
= 0.09167

allow a correct calculation using incorrectly determined value(s) for difference in volume and / or time

1

= 0.092 (cm^3/s)

allow a correctly calculated answer given to 2 significant figures from an incorrect attempt at the rate equation

1

(d) line starts at origin **and** less steep than solid line

1

line levelling off at 40 (cm^3)

allow a tolerance of ± ½ a small square

1

(e) (because) surface area (of fine manganese dioxide powder) greater

allow converse for coarse lumps

1

(so) more collisions (with hydrogen peroxide molecules / particles) per unit time

*do **not** accept references to changes in*

kinetic energy or speed (of molecules / particles)
ignore references to activation energy.

1

[11]

Q6.

(a) 83 (cm^3)

allow 83.0 / 83.00

1

(b) mass of magnesium powder

1

temperature of hydrochloric acid

1

(c) $\frac{(46 + 47 + 49)}{3}$

*allow 47.3(333) (cm^3) for **1** mark*

1

= 47 (cm^3) (2 sf)

*an answer of 43 (cm^3) scores **1** mark*

1

*an answer of 47 (cm^3) scores **2** marks*

(d) all points plotted correctly (inc 0,0)

allow a tolerance of ±½ a square
*allow ecf from question **(c)***
ignore line
*allow **1** mark for four points plotted correctly*

2

(e) $\frac{80}{50}$

allow 80 ± 2

1

= 1.6 (cm^3/s)

allow 1.60 ± 0.04

1

*an answer of 1.6 (cm^3/s) scores **2** marks*

(f) rate is greatest at start

allow rate is faster at start

1

(then) rate decreases

allow (then) rate slows down

1

reaction stops

1

(g) there are more particle collisions each second

1

there are more particles in the same volume

1

(h) (gas is) not carbon dioxide

ignore does not react with limewater

1

(i) hydrogen

allow H_2

1

pop sound

1

[17]

Q7.

(a) sodium chloride

or

salt

allow dissolved salts

1

(b) expensive

1

(c) to remove solids

1

(d) to sterilise the water

allow to kill microorganisms

1

(e) test: (damp) litmus paper

1

result: bleached

or

turns white

1

(f) pH: 7.0

1

mass of dissolved solid: 0.0 (g)

1

(g) 0.05 g

1

(h) did not immerse the thermometer (bulb)

1

[10]

Q8.

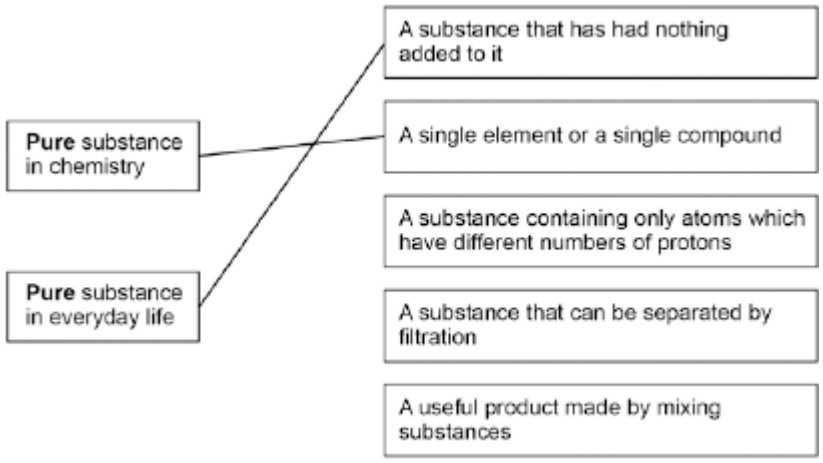
(a) Air

2

Steel

1

(b)



Allow **1** mark for the correct meanings linked to context but incorrect way around

1

(c) Damp litmus paper turns white

1

(d) Iron(III)

1

[6]