Cambridge IGCSE™

COMBINED SCIENCE **0653/61**

Paper 6 Alternative to Practical **October/November 2022**

MARK SCHEME

Maximum Mark: 40

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

Question	Answer	Marks
1(a)(i)	syringe / measuring cylinder ;	**1**
1(a)(ii)	24.5 ; 11.0 ;	**2**
1(a)(iii)	2.6 ;	**1**
1(a)(iv)	2.4 ;	**1**
1(a)(v)	as temperature increases, the rate of respiration increases / ORA ;	**1**
1(a)(vi)	use insulation / add a lid / use a polystyrene beaker / keep adding warm water / use a thermostatically controlled water bath / use an electric water bath ;	**1**
1(b)(i)	axes correct way round and labelled with units ; suitable linear scales such that plots cover at least half of grid ; plots correct ;	**3**
1(b)(ii)	best-fit curve suitable for plots ;	**1**
1(b)(iii)	*support* higher temperature gives higher volume of gas / graph has a positive gradient ; OR *do not support* graph levels off / no increase, after 20 °C / at higher temperature / after 5 cm^3 of gas collected ;	**1**
1(b)(iv)	reaction has finished / no more respiration / sugar used up / not enough sugar / syringe only holds 5 cm^3 / gas syringe is full ;	**1**

Question	Answer	Marks
2(a)(i)	*any two from:* increase the concentration (of acid) ; heat mixture / increase temperature ; use powdered, solid / **K** ;	**2**
2(b)(i)	carbon dioxide ;	**1**
2(b)(ii)	carbonate ;	**1**
2(c)	*any three from:* fizzes / bubbles ; solid / **M**, gets smaller ; (gas gives) squeaky pop (with a lighted splint) ; (temperature) reading on thermometer increases ;	**3**

Question	Answer	Marks
3	*one marking point from each section and then any two others* **1 apparatus** balance / measuring cylinder, used to measure hydrogen peroxide ; gas syringe / measuring cylinder in water, used for collecting gas ; **2 brief description of method and safety precautions** idea of adding manganese(IV) oxide to hydrogen peroxide AND waiting for, complete reaction / volume of gas to stop increasing / bubbles to stop ; detail given about, sealing apparatus / putting in bung immediately after adding, manganese(IV) oxide / hydrogen peroxide ; repeat the (same) procedure using <u>different masses</u> of manganese(IV) oxide ; use <u>at least 4</u> different masses of manganese(IV) oxide ; wearing, safety glasses / goggles, to keep, hydrogen peroxide / manganese(IV) oxide powder, out of eyes ; **3 measurements** measure mass of manganese(IV) oxide used / stated mass of manganese(IV) oxide used / units of mass of manganese(IV) oxide stated as grams ; measure the volume of hydrogen peroxide used / stated volume of hydrogen peroxide used / states units of volume for hydrogen peroxide as cm^3 ; measure volume of gas / states units for volume of gas as cm^3 ; **4 constant variables** volume of hydrogen peroxide ; concentration of hydrogen peroxide ; temperature ; **5 processing** plot graph of volume against mass / calculate ratio of volume of gas to mass, of manganese(IV) oxide added ; take averages from repeated experiments / repeat and exclude anomalous results ;	**7**

Question	Answer	Marks
4(a)	15(.0 cm) ; halfway between 14 and 16 / the average of 14 and 16 / (14+16) ÷ 2 / radius of 1 cm, added to 14 / subtracted from 16 ;	**2**
4(b)(i)	40.6 (cm) ;	**1**
4(b)(ii)	25.6 (cm) ;	**1**
4(b)(iii)	9.4 (cm) ;	**1**
4(c)	81.702 (g) ; 82 / answer to two sig. figs. ;	**2**
4(d)(i)	1(.0 N) ; 1.0 (N) / answer to the nearest 0.1 (N) ;	**2**
4(d)(ii)	100 (g) ;	**1**
4(e)	(top-pan / electronic) balance ;	**1**
4(f)	calculates difference between higher and lower value ; calculates percentage difference AND states appropriate conclusion ; OR calculates 10% increase of lower value / 10% decrease of higher value ; compares higher value to 10% range of lower value AND states appropriate conclusion / compares lower value to 10% range of higher value AND states appropriate conclusion ;	**2**