



Pearson

Mark Scheme (Results)

November 2020

Pearson Edexcel GCSE
In Combined Science (Chemistry) (1SC0) Paper
2CF

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

November 2020

Publications Code 1SC0_2CF_2011_MS

All the material in this publication is copyright

© Pearson Education Ltd 2020

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response
- Mark schemes have been developed so that the rubrics of each mark scheme reflects the characteristics of the skills within the AO being targeted and the requirements of the command word. So for example the command word 'Explain' requires an identification of a point and then reasoning/justification of the point.

Explain questions can be asked across all AOs. The distinction comes whether the identification is via a judgment made to reach a conclusion, or, making a point through application of knowledge to reason/justify the point made through application of understanding. It is the combination and linkage of the marking points that is needed to gain full marks.

When marking questions with a 'describe' or 'explain' command word, the detailed marking guidance below should be consulted to ensure consistency of marking.

Assessment Objective		Command Word	
Strand	Element	Describe	Explain
AO1*		An answer that combines the marking points to provide a logical description	An explanation that links identification of a point with reasoning/justification(s) as required

AO2		An answer that combines the marking points to provide a logical description, showing application of knowledge and understanding	An explanation that links identification of a point (by applying knowledge) with reasoning/justification (application of understanding)
AO3	1a and 1b	An answer that combines points of interpretation/evaluation to provide a logical description	
AO3	2a and 2b		An explanation that combines identification via a judgment to reach a conclusion via justification/reasoning
AO3	3a	An answer that combines the marking points to provide a logical description of the plan/method/experiment	
AO3	3b		An explanation that combines identifying an improvement of the experimental procedure with a linked justification/reasoning

*there will be situations where an AO1 question will include elements of recall of knowledge directly from the specification (up to a maximum of 15%). These will be identified by an asterisk in the mark scheme.

Question number	Answer	Mark
1(a)(i)	A argon This is the only correct answer. B is incorrect because butane is not found in the air C is incorrect because chlorine is not found in the air D is incorrect because hydrogen is only found in the air in extremely small amounts	(1)

Question number	Answer	Mark
1(a)(ii)	C 21 This is the only correct answer. A, B and D are incorrect	(1)

Question number	Answer	Additional guidance	Mark
1(b)	carbon dioxide	allow CO ₂	(1)

Question number	Answer	Additional guidance	Mark
1(c)	An explanation linking any two <ul style="list-style-type: none"> • Earth cooled (1) • water (vapour) condensed (1) • oceans formed /seas formed/ rainfall (1) 	allow temperature decreased	(2)

Question number	Answer	Mark
1(d)(i)	allow 2 for correct answer with or without working change in concentration = 410.83 - 407.96 (= 2.87) (1) = 3 (1)	(2)

Question number	Answer	Additional guidance	Mark
1(d)(ii)	volcanic activity / burning of fossil fuels / deforestation / respiration	allow more vehicles on road ignore global warming / ice-caps melting / farming	(1)

(Total for Question 1 = 8 marks)

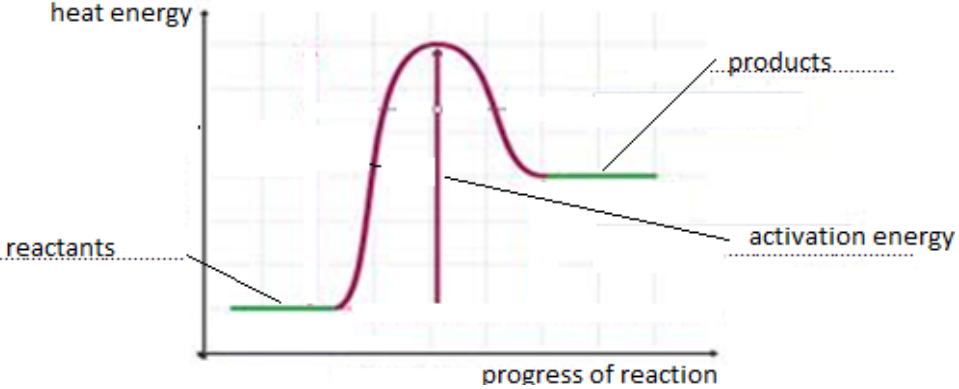
Question number	Answer	Additional guidance	Mark
2(a)(i)	potassium + lead (1) → lead + potassium (1) iodide nitrate iodide nitrate left hand side (1) right hand side (1)	ignore formulae	(2)

Question number	Answer	Additional guidance	Mark
2(a)(ii)	(mass conserved because) the numbers are the same/nothing is lost/nothing is gained	allow same mass / same weight / same amount	(1)

Question number	Answer	Additional guidance	Mark
2(b)(i)	measuring cylinder / (volumetric) pipette / burette	ignore dropping pipette / beaker	(1)

Question number	Answer	Additional Guidance	Mark
2(b)(ii)	measure the initial temperature (of the water)	allow subtract initial temperature from final temperature OR vice versa allow temperature before mixing	(1)

Question number	Answer	Additional Guidance	Mark
2(b)(iii)	insulator / reduces heat transfer / poor conductor of heat	ignore references to heat loss	(1)

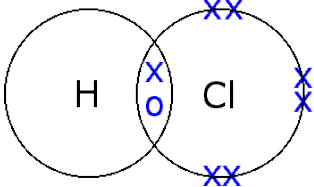
Question number	Answer	Mark
2(b)(iv)	<ul style="list-style-type: none"> • any one label correct (1) • all three labels correct (1) <div style="text-align: center;">  <p>The diagram is a reaction energy profile. The vertical axis is labeled 'heat energy' and the horizontal axis is labeled 'progress of reaction'. A red curve starts at a horizontal line labeled 'reactants', rises to a peak, and then falls to a lower horizontal line labeled 'products'. A vertical line with arrows at both ends connects the 'reactants' level to the peak, and is labeled 'activation energy'.</p> </div>	(2)

(Total for Question 2 = 8 marks)

Question number	Answer	Additional Guidance	Mark
3(a)	use of fume-cupboard / fume hood	allow adequate ventilation, gloves (to prevent skin absorption) ignore breathing apparatus, gas mask, mask, PPE	(1)

Question number	Answer	Additional guidance	Mark
3(b)(i)	hydrogen + chlorine → hydrogen chloride	answer must contain a "+" between reactants allow reactants on LHS in either order allow $H_2 + Cl_2 \rightarrow 2HCl$ allow multiples on balanced equation ignore state symbols	(1)

Question number	Answer	Mark
3(b)(ii)	(turns) red /pink	(1)

Question number	Answer	Additional guidance	Mark
3(b)(iii)		6 electrons drawn in outer shell of Cl (1) ignore inner shells of electrons even if incorrect	(1)

Question number	Answer	Additional guidance	Mark
3(b)(iv)	covalent	ignore other words reject ionic / metallic	(1)

Question number	Answer	Additional guidance	Mark
3(c)	chlorine is more reactive than bromine / chlorine can displace bromine	ignore "chlorine is more reactive" alone	(1)

Question number	Answer	Additional guidance	Mark
3(d)(i)	(lamp) does not light up / unlit / 'nothing'	ignore turn off / no reaction	(1)

Question number	Answer	Additional guidance	Mark
3(d)(ii)	(lamp) lights up / glows / works	ignore becomes brighter / dimmer	(1)

Question number	Answer	Additional guidance	Mark
3(e)	<p>A description including</p> <ul style="list-style-type: none"> conductivity increases and then decreases (1) <p>AND any one <i>quantitative description</i> from</p> <ul style="list-style-type: none"> conductivity increases (from 0) to 150 (g dm⁻³) (1) conductivity reaches maximum at 150 (g dm⁻³) (1) conductivity then decreases from 150 (to 500) (g dm⁻³) (1) 	allow positive correlation for increases and negative correlation for decreases	(2)

(Total for Question 3 = 10 marks)

Question number	Answer	Additional guidance	Mark
4(a)(i)	methane + oxygen (1) → water + carbon dioxide (1)	ignore symbols reject other substances on either side for that mark	(2)

Question number	Answer	Additional guidance	Mark
4(a)(ii)	limited supply of oxygen	ignore air	(1)

Question number	Answer	Additional guidance	Mark
4(b)(i)	bitumen	reject other fractions	(1)

Question number	Answer	Additional guidance	Mark
4(b)(ii)	gases	reject other fractions	(1)

Question number	Answer	Mark
4(c)	B gases, petrol, diesel oil This is the only correct answer. A is incorrect because only diesel oil has a relative demand greater than the relative amount obtained C is incorrect only gases and petrol have a relative demand greater than the relative amount obtained D is incorrect only petrol and diesel oil have a relative demand greater than the relative amount obtained	(1)

Question number	Answer	Mark
4(d)(i)	x = 6	(1)

Question number	Answer	Additional guidance	Mark
4(d)(ii)	<p>allow 2 for correct answer with or without working</p> <p>170 (g) dodecane forms 114 (g) octane</p> <p>1 (g) dodecane forms $\frac{114}{170}$ (g) octane (1)</p> <p>340 (g) dodecane forms $\frac{114}{170} \times 340$ (1) (= 228(g))</p>	<p>OR</p> <p>$\frac{340}{170}$ (1) (= 2)</p> <p>2 x 114 (1) (= 228 (g))</p>	(2)

(Total for Question 4 = 9 marks)

Question number	Answer	Additional guidance	Mark
5(a)(i)	2.8.8.1	allow any separator including gaps e.g. 2 8 8 1 send to review any diagrams	(1)

Question number	Answer	Mark
5(a)(ii)	B 19 (protons) 20 (neutrons) This is the only correct answer. A is incorrect because there are 20 neutrons in the ion C is incorrect because there are 19 protons and 20 neutrons D is incorrect because there are 19 protons in the ion	(1)

Question number	Answer	Additional guidance	Mark
5(b)	An explanation linking <ul style="list-style-type: none"> outer (electron) shell (1) (both have) {same number / 1} electron(s) (1) 	allow both lose 1 electron (to form ion / to form noble gas configuration) reject same number of outer shells / same number of electrons MP2 depends on MP1	(2)

Question number	Answer	Additional guidance	Mark
5(c)	An explanation linking <ul style="list-style-type: none"> (intermolecular) forces are weak (1) little energy needed (to overcome forces) (1) 	allow intermolecular bonds / weak bonds between molecules ignore needs a low temperature to break	(2)

Question number	Answer	Additional guidance	Mark
5(d)	$2\text{K (s)} + \text{F}_2\text{(g)} \rightarrow 2\text{KF (s)}$ 2 K (1) 2 KF (1) s, s (1)	ignore words	(3)

Question number	Answer	Mark
5(e)	A alkali metals A is the only correct answer. B is incorrect because fullerenes are not a group in the periodic table C is incorrect because halogens are group 7 D is incorrect because noble gases are group 0	(1)

Question number	Answer	Mark
5(f)(i)	any value between 51 (°C) and 70 (°C)	(1)

Question number	Answer	Mark
5(f)(ii)	iodine and astatine	(1)

(Total for Question 5 = 12 marks)

Question number	Answer	Additional guidance	Mark
6(a)(i)	larger surface area {higher /faster} rate /ORA	answer must be comparative	(1)

Question number	Answer	Additional guidance	Mark
6(a)(ii)	<p>final answer of 0.3 with or without working scores 3</p> <p>MP1 : conversion of time from minutes into seconds $5 \times 60 = 300$ (seconds) (1)</p> <p>MP2 : rate = volume / time rate = $\frac{90}{300}$ (1)</p> <p>MP3 : evaluation of the <u>fraction</u> = 0.3 ($\text{cm}^3 \text{s}^{-1}$) (1)</p>	<p>allow</p> <p>90/5 (1)</p> <p>90/5 = 18 (2)</p> <p>300/90 = 3.33 (2)</p> <p>5/90 = 0.0556 (1)</p>	(3)

Question number	Answer	Additional guidance	Mark
6(a)(iii)	<p>An explanation linking three of the following</p> <ul style="list-style-type: none"> particles have more energy (1) so (particles) move <u>faster</u> (1) (so) there are more frequent collisions between particles (1) higher proportion of collisions have at least the activation energy to react when particles collide (1) 	<p>allow more kinetic energy for MP1 and MP2</p> <p>needs to be comparative</p> <p>allow greater chance of collision</p> <p>allow higher {proportion / chance} of collisions are successful / productive</p> <p>allow more particles have activation energy</p>	(3)

Question number	Indicative content	Mark
*6(b)	<p>Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme.</p> <p>The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant.</p> <p>Additional content included in the response must be scientific and relevant.</p> <p>A plan to include some of the following points</p> <ul style="list-style-type: none"> • measure equal masses of zinc using balance • measure equal volumes of acid using measuring cylinder/pipette/suitable named piece of apparatus • pour acid in suitable container • record initial temperature • use of thermometer • add zinc to acid • place bung with delivery tube in container / reaction vessel immediately after the zinc is added • use of timer • start timer on addition of zinc • measure volume of gas evolved using a delivery tube and inverted measuring cylinder/burette over water OR delivery tube and (gas) syringe • record time to collect fixed volume of gas • record final/highest temperature • calculate the temperature increase • repeat for procedure • same initial temperature • same size pieces of zinc • same volume of acid <p>credit use a suitable labelled diagram of apparatus for rate measurement/ temperature of acid</p>	(6)

Level	Mark	Additional Guidance	General additional guidance – the decision within levels Eg - At each level, as well as content, the scientific coherency of what is stated backed up by planning detail will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	<u>Additional guidance</u> Identifies relevant practical operations such as <ul style="list-style-type: none"> • carries out basic reaction – add zinc to acid • measures at least one of mass, time, volume, temperature 	<u>Possible candidate responses</u> <ul style="list-style-type: none"> • put zinc in test tube and add some acid • find the mass of zinc • measure volume of the acid • carries out basic reaction or measures at least one factor with details scores upper part of level
Level 2	3–4	<u>Additional guidance</u> Some correct sequencing of correct operations <ul style="list-style-type: none"> • carries out basic reaction with dilute acid and repeat with the more concentrated acid <u>and</u> • carries out reaction makes some relevant observation or obtains a result <u>or</u> • measures at least two of mass, time, volume, temperature 	<u>Possible candidate responses</u> <ul style="list-style-type: none"> • put zinc in test tube, add acid and time the reaction • put zinc in test tube, add dilute acid, then repeat experiment and add more concentrated acid • measures mass of zinc and measures volume of acid before adding together • measures temperature of acid before adding to zinc and measures temperature at end of reaction • a similar description, but with detail of apparatus scores the upper part of the level
Level 3	5–6	<u>Additional guidance</u> Sequence of operations of an experiment to include two from <ul style="list-style-type: none"> • measures temperature and volume of acid, and mass of zinc • repeats expt but with more concentrated acid • measure temperature of reaction mixture at end and finds temperature rise 	<u>Possible candidate responses</u> <ul style="list-style-type: none"> • record temperature of 25 cm³ dilute acid, add to known mass of zinc, record temperature after reaction • using suitable apparatus measure volume of gas every minute • repeat experiment using same conditions but using the more concentrated acid • work out temperature rises for both reactions • descriptions with detail or workable method scores upper part of level

(Total for Question 6 = 13 marks)

