edexcel

Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE in Chemistry (5CH1H) Paper 01 Unit C1: Chemistry in Our World

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

Summer 2015
Publications Code UG042606

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.

Quality of Written Communication

Questions which involve the writing of continuous prose will expect candidates to:

- Write legibly, with accurate spelling, grammar and punctuation in order to make the meaning clear
- Select and use a form and style of writing appropriate to purpose and to complex subject matter
- Organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.

Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Acceptable answers	Mark
1(a)	A description including three from • sediments (form) /{small rocks / pebbles / stones / shells / animals} {are deposited (on the sea bed) / fall to the bottom (of the sea bed)} (1) • layering / layers (1) • compaction / (sediments / layers) {compacted / compressed / under pressure} / sediments stuck together / particles 'cemented' together (1) • over millions of years / long time (1)	allow sediments transported as alternative to sediments form accept any reference to layering ignore hundreds / thousands descriptions of igneous or metamorphic rock formation scores 0	**(3)**

Question Number	Answer	Acceptable answers	Mark
1(b)	metamorphic		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	3.75 − 2.10 (1) (= 1.65 (g))	1.65 (g)	**(1)**

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	**D** carbon dioxide		**(1)**

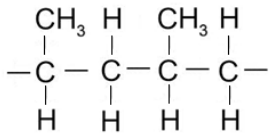
Question Number	Answer	Acceptable answers	Mark
1(d)	An explanation linking • (they) neutralise / react with (acid soils) (1) • acid (substances in soils) / acidity (1)	 allow increase pH (calcium carbonate and calcium hydroxide) are basic /alkaline reduce acidity (1)	**(2)**

Total for Question 1 = 8 marks

Question Number	Answer	Acceptable answers	Mark
2(a)(i)	An explanation linking (a compound containing) • hydrogen and carbon (1) • (hydrogen and carbon) only (1) • contains double / multiple bond (between carbon atoms) (1)	 ignore H and C reject {ions/molecule} of carbon and hydrogen reject mixture reject oxygen ignore 'spare bonds' allow carbon atoms not joined to the maximum number of other atoms	**(3)**

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	**B** cracking		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(a)(iii)	A description to include • (bromine water is) orange (1) • decolourises / turns colourless (1)	 allow brown / yellow or combinations eg orange-yellow ignore red (alone) ignore clear / changes colour / discolour	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(b)(i)	**D** 		**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(ii)	waterproof / rot-proof / strong / flexible / does not react with oxygen / water resistant / weather proof	allow durable / tough ignore ductile / stretchy	**(1)**

Question Number	Answer	Acceptable answers	Mark
2(b)(iii)	not biodegradable / persist in landfill sites / does not decompose	ignore answers in terms of burning / allow takes a long time to rot / decompose / takes up space in landfill	**(1)**

Total for Question 2 = 9 marks

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	answer must refer to water vapour water vapour condensed / rain falls / water vapour removed / (water vapour) turns to water		**(1)**

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	An explanation linking • carbon dioxide (level) reduced (1) • so oxygen (level) increased (1)	 carbon dioxide turned into oxygen (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(b)(i)	$2Cu + O_2 \rightarrow 2CuO$ (3) lhs (1) rhs (1) balancing of correct formulae (1)	accept multiples ignore state symbols even if incorrect	**(3)**

Question Number	Answer	Acceptable answers	Mark
3(b)(ii)	$\frac{21}{100}$ x 50 (1) (= 10.5 cm^3) 50 minus answer to previous step (1) or 100 − 21 (1) (= 79 cm^3) $\frac{79}{100}$ x 50 (1) (= 39.5 cm^3)	correct answer with no working / 39.5 (cm^3) (2) allow TE allow TE	**(2)**

Question Number	Answer	Acceptable answers	Mark
3(b)(iii)	**C** nitrogen		**(1)**

Total for Question 3 = 9 marks

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	electrical (energy) / electricity / direct (electric) current		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(a)(ii)	A description including • {light / ignite} gas / lighted splint (1) • gas burns / (squeaky) pop (if air is present) (1)	 reject glowing splint second mark conditional on first	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(b)	sea water / salt / brine / sodium chloride (solution)		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)(i)	**D** salt and water only		**(1)**

Question Number	Answer	Acceptable answers	Mark
4(c)(ii)	A description to include two from • (green) solid {disappears / dissolves} (1) • effervesces / bubbles (of colourless gas) given off (1) • blue (solution) forms (1)	 ignore references to names of products fizz goes blue ignore incorrect colours of solution ignore temperature rise	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)(i)	An explanation linking • tablet C (1) • because it neutralises greatest volume of acid (1)	ignore references to rate	**(2)**

Question Number	Answer	Acceptable answers	Mark
4(d)(ii)	• {crushed tablets / chewed tablets} have a shorter reaction time (than whole tablets) (1)	ignore crushed because times are quicker / larger surface area / do not need to break down	**(1)**

Total for Question 4 = 10 marks

Question Number	Answer	Acceptable answers	Mark
5(a)	<u>burns</u> easily / <u>produces</u> little ash / <u>produces</u> little smoke / <u>produces</u> high heat energy (per unit mass) / <u>easy</u> to {store / transport}	'renewable' / few pollutants / few emissions / easy to ignite / burns cleanly Ignore references to cost	**(1)**

Question Number	Answer	Acceptable answers	Mark
5(b)(i)	An explanation linking • an advantage • with a linked reason examples include • bioethanol is always available / crude oil is finite (1) • because more sugar beet can be grown / crude oil takes a long time to form / bioethanol conserves crude oil (1) OR • bioethanol produces less carbon dioxide (1) • because bioethanol is 'carbon neutral' / ora (1) OR • bioethanol uses less energy in production (1) • because fermentation does not require energy / crude oil must be heated to obtain petrol (1)	 allow crops (= sugar beet) allow renewable bioethanol is less polluting	**(2)**

Question Number	Answer	Acceptable answers	Mark
5(b)(ii)	$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$ (3) lhs (1) rhs (1) balancing correct formulae (1)	allow multiples ignore state symbols even if incorrect.	**(3)**

Question Number		Indicative Content	Mark
QWC	***5(c)**	An explanation linking some of the following points properties • petrol has shorter (carbon) chains /ORA • petrol has lower {melting point / boiling point} / ORA • petrol has lower viscosity / ORA • petrol {ignites / burns} more easily / ORA • bitumen does not combust completely (due to high number of carbon atoms per molecule) • burning bitumen produces lots of carbon monoxide/soot uses of petrol fraction • fuels in cars / in motorbikes / transportation uses of bitumen fraction • used for road (surfacing) • used for roofing / flooring	**(6)**
Level	**0**	No rewardable content	
1	**1 – 2**	• a limited explanation of petrol or bitumen eg petrol easily ignites • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 – 4**	• a simple explanation of at least two properties or uses of petrol or bitumen or a combination of uses and properties eg petrol from the top ignites easily, has a low boiling point and is used as a fuel. • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 – 6**	• a detailed explanation of at least two different properties of petrol or bitumen **and** at least one use of petrol and at least one use of bitumen eg petrol has a lower boiling point and is used as a fuel in cars, bitumen is more viscous and is used to surface roads. • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Total for Question 5 = 12 marks

Question Number	Answer	Acceptable answers	Mark
6(a)	loss of oxygen	gain of electrons	**(1)**

Question Number	Answer	Acceptable answers	Mark
6(b)	An explanation to include • aluminium high in reactivity series / aluminium more reactive than {carbon / iron} (1) • (aluminium reduction) needs more energy / electrolysis is {more / very} powerful (means of reduction) / carbon cannot displace aluminium (from aluminium oxide) (1)	 aluminium compounds are stable aluminium is more reactive ignore just 'very reactive'/highly reactive allow stronger (method of reduction)	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(c)	$2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2$ (3) lhs (1) rhs (1) balancing correct formulae (1)		**(3)**

Question Number		Indicative Content	Mark
QWC	***6(d)**	A description including some of the following points **Property change (other than increased strength) or use of alloy** • increased hardness • decreased malleability • increased corrosion resistance • shape-memory • gold alloy for jewellery • stainless steel used for cutlery • steel used for construction • nitinol (shape-memory alloy) used for spectacle frames / stents • idea of any use of metal after alloying **Structural change** • pure metal − atoms are all the same size / suitable diagram of pure metal structure • atoms arranged in a regular way / lattice • alloy − atoms are of different sizes / suitable diagram of alloy structure • disrupts arrangement of atoms • atoms in pure metal structure can slide over each (when bent) • alloy − sliding prevented by different sized atoms	**(6)**

Level	0	No rewardable content
1	1 – 2	• a limited description of how one property changes, one use or one statement related to structure eg iron rusts, stainless steel does not; atoms in a pure metal all the same size • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy
2	3 – 4	• a simple description of how two properties change or two uses **or** a simple description of why alloys become stronger or a property/use and a statement about structure eg the atoms in a pure metal have a regular arrangement but in alloys there are different sized atoms • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy
3	5 – 6	• a detailed description of why alloys become stronger including at least one change in property of an alloy or use eg the atoms in a pure metal have a regular arrangement but in alloys the different sized atoms stops the atoms sliding over each other and how alloys are more useful such as gold alloys used in jewellery • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

Total for Question 6 = 12 marks

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom