



Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE
In Chemistry (5CH2F) Paper 01



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 2017

Publications Code 5CH2F_01_1706_MS

All the material in this publication is copyright

© Pearson Education Ltd 2017

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.

Question number	Answer	Acceptable answers	Marks
1 (a) (i)	bubbles / effervescence / fizzes / {solid/zinc} {disappears/dissolves}	ignore other descriptions eg cloudy	(1)

Question number	Answer	Acceptable answers	Marks
1 (a) (ii)	zinc + hydrochloric → zinc + hydrogen (2) acid chloride LHS (1) RHS (1)	allow complete equation $Zn + 2HCl \rightarrow ZnCl_2 + H_2$ (2) ignore 'dilute', 'gas' ignore any state symbols reject symbol for either side of equation	(2)

Question number	Answer	Acceptable answers	Marks
1 (a) (iii)	a description to include <ul style="list-style-type: none"> test : measure temp of liquid before and after / (use a) thermometer (1) result : {if temp increases / becomes warmer} (1) 	allow feel it ignore temp change ignore heat rises	(2)

Question number	Answer	Acceptable answers	Marks
1 (a) (iv)	decrease size of pieces of zinc / use a powder / increase surface area / OWTTE (1)	allow crush the zinc allow cut into small pieces, but ignore just cut ignore use less reject other means of changing rate eg use of catalyst	(1)

Question number	Answer	Acceptable answers	Marks
1 (b)	increases / speeds up / makes it faster (1)	reject faster time reject time gets quicker reject speeds up reaction time	(1)

(Total for Question 1 = 7 marks)

Question number	Answer	Marks
2 (a)	<p>D 3 – 2 – 1</p> <p>The only correct answer is D</p> <p>A is not correct because cleaning the wire must be first step (step 3)</p> <p>B is not correct because cleaning the wire must be first step (step 3)</p> <p>C is not correct because cleaning the wire must be first step (step 3)</p>	(1)

Question number	Answer	Acceptable answers	Marks
2 (b)	<p>(2) Each correct line (1)</p>	Max 1 line from each test	(2)

Question number	Answer	Acceptable answers	Marks
2 (c)	$\text{KNO}_3 / \text{K}^+\text{NO}_3^-$	Not $\text{KNO}_3 / \text{KNO}^3 / \text{KNO}_3 / \text{KNO}_3 / \text{Kno}_3$ ignore brackets eg $\text{K}(\text{NO}_3)$ (1)	(1)

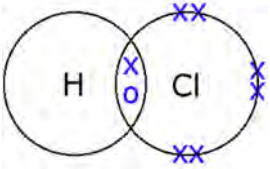
Question number	Answer	Acceptable answers	Marks
2 (d) (i)	LHS - sodium carbonate (1) RHS – sodium sulfate (1)	ignore 'solution' ignore any state symbols RHS – sodium sulphate do not accept formulae	(2)

Question number	Answer	Acceptable answers	Marks
2 (d) (ii)	A description including <ul style="list-style-type: none"> • filter / decant off liquid (1) • wash (with (distilled/deionised/pure) water) (1) • (leave to) dry / leave in a warm place / dry in a warm oven (1) mps 2 and 3 depend on mp 1	ignore sieve filter funnel alone (0) allow use of filter paper (1) ignore clean allow other methods such as between filter papers etc reject heat to dry/ hot oven points should be credited in that order – so filter and leave to dry scores 2, wash & filter scores 1 etc ignore anything before filtration	(3)

(Total for Question 2 = 9 marks)

Question number	Answer	Acceptable answers	Marks
3 (a)	<p>A description to include</p> <ul style="list-style-type: none"> hydrogen AND oxygen (atoms) (1) 2(hydrogen) and 1 (oxygen) (1) <p>2nd mp dependent on mention of hydrogen and oxygen</p>	<p>ignore H and O / bonds / elements</p> <p>reject molecules for 1st mp</p> <p>if mentioned only 1 element eg 2 hydrogen atoms: scores 0</p>	(2)

Question number	Answer	Acceptable answers	Marks
3 (b)	<p>A description to include</p> <ul style="list-style-type: none"> shared electron(s) (1) {pair of / two} (electrons) (1) <p>2nd mp dependent on 1st</p>	<p>allow one electron from each (1)</p> <p>any idea of ionic = 0</p> <p>allow more than one shared pair</p>	(2)

Question number	Answer	Acceptable answers	Marks
3 (c)	 <p>one shared pair between Cl and H (1) rest of diagram correct (1)</p>	<p>circles do not have to be there</p> <p>remaining electrons on Cl either singly or paired</p> <p>ignore symbols even if incorrect</p> <p>ignore any inner shells shown</p> <p>2nd mark dependent on 1st</p> <p>allow all dots or all crosses</p>	(2)

Question number	Answer	Acceptable answers	Marks
3 (d) (i)	separating funnel	<p>separating tube</p> <p>ignore separator</p>	(1)

Question number	Answer	Marks
3 (d) (ii)	<p>A immiscible</p> <p>The only correct answer is A</p> <p>B is not correct because inert refers to reactivity</p> <p>C is not correct because insoluble refers to a solid not dissolving</p> <p>D is not correct because ionic is a type of bonding</p>	(1)

Question number	Answer	Acceptable answers	Marks
3 (e)	<p>An explanation linking</p> <ul style="list-style-type: none"> • weak {forces/attractions} between {molecules/particles} / water is a simple molecule / simple covalent structure (1) • little energy needed to separate {molecules/particles} (1) 	<p>allow intermolecular forces</p> <p>ignore bonds between molecules</p> <p>ignore break bonds (between atoms)</p> <p>ignore references to temperature</p>	(2)

(Total for Question 3 = 10 marks)

Question number	Answer	Marks
4 (a) (i)	<p>D precipitation</p> <p>The only correct answer is D</p> <p>A is not correct because combustion is a reaction of a fuel</p> <p>B is not correct because separation is a physical process</p> <p>C is not correct because neutralisation is a reaction between an acid and an alkali</p>	(1)

Question number	Answer	Acceptable answers	Marks
4 (a) (ii)	$\text{Pb}(\text{NO}_3)_2 (\text{aq}) + 2\text{NaI} (\text{aq}) \rightarrow \text{PbI}_2 (\text{s}) + 2\text{NaNO}_3 (\text{aq})$ <p>s (1) aq (1)</p>	not solid not aqueous	(2)

Question number	Answer	Acceptable answers	Marks
4 (a) (iii)	$23 + 14 + (16 \times 3) (1) = (85)$	85 alone (1)	(1)

Question number	Answer	Acceptable answers	Marks
4 (a) (iv)	$\frac{207}{461} \quad (= 0.45 / 0.449) \quad (1)$ $(207/461) \times 100 (= 45\% / 44.9\%) \quad (1)$	 (any fraction) x 100 (1) 45 or 44.9% no working (2)	(2)

Question number	Answer	Acceptable answers	Marks
4 (b) (i)	$\frac{3.5}{5.0} \quad (= 0.7) \quad (1)$ $(3.5/5.0) \times 100 (= 70\%) \quad (1)$	70% no working (2) (any fraction) x 100 (1)	(2)

Question number	Answer	Acceptable answers	Marks
4 (b) (ii)	Any two from <ul style="list-style-type: none">loss of {reactants/products/substances/chemicals} (during {process/transfer}) (1)incomplete reactions (1){competing/unwanted/side} reactions (1)	ignore impure reactants / impurities ignore spillage allow not all used up allow it could react with air (1) do not allow loss of gas	(2)

(Total for Question 4 = 10 marks)

Question number	Answer	Acceptable answers	Marks
5 (a)	arranged by order of (relative) atomic mass / (in Mendeleev's early periodic table) gaps / fewer elements / elements in wrong place / noble gases were not present reverse arguments apply	unless specifically referred to modern table, assume answer refers to Mendeleev's table	(1)

Question number	Answer	Acceptable answers	Marks
5 (b) (i)	18 / eighteen		(1)


Question number	Answer	Acceptable answers	Marks
5 (b) (ii)	He/Ne/Kr/Xe/Rn	do not accept pairs of uppercase /lowercase letters eg HE, xe ignore names and atomic number	(1)

Question number	Answer	Marks
5 (b) (iii)	C -1, 0, +1 The only correct answer is C A is not correct because incorrect charges on neutron and proton B is not correct because incorrect charges on electron and proton D is not correct because incorrect charges on electron and neutron	(1)

Question number	Answer	Acceptable answers	Marks
5 (c)	An explanation linking <ul style="list-style-type: none"> three (electrons) (1) electrons in outer shell (1) 	allow in outer ring / energy level allow 'needs to lose 3 electrons' (1)... 'to have a full outer shell' (1)	(2)

Question Number		Indicative Content	Mark
QWC	*5d	<p>An explanation to include some of the following points</p> <ul style="list-style-type: none"> • protons and neutrons in nucleus / use of diagram • electrons in shells • electron shells surround nucleus / use of diagram • sodium has 3 electron shells • fluorine has 2 electron shells • sodium atoms lose 1 electron • from outer shell / to obtain full outer shell • to form {sodium ions / Na⁺} • fluorine atoms gain 1 electron • in outer shell / to obtain full outer shell • to form {fluoride ions / F⁻} • electron transfers from sodium to fluorine • opposite ions attract 	(6)
Level	0	No rewardable content	
1	1 - 2	<ul style="list-style-type: none"> • a limited explanation e.g. protons and neutrons are in the nucleus. • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy 	
2	3 - 4	<ul style="list-style-type: none"> • a simple explanation e.g. the atomic structure of either sodium or fluorine atoms OR how ions of sodium or fluorine are formed • 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	<ul style="list-style-type: none"> • a detailed explanation e.g. the atomic structure of atoms of both elements OR how ions of both elements are formed OR atomic structure of one element and how the atom of that element forms the ion. • 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	Marks
6 (a) (i)	<p>C </p> <p>The only correct answer is C</p> <p>A is not correct because symbol is for a flammable substance</p> <p>B is not correct because symbol is for a corrosive substance</p> <p>D is not correct because symbol is for a substance harmful to the environment</p>	(1)

Question number	Answer	Acceptable answers	Marks
6 (a) (ii)	<p>A description to include</p> <ul style="list-style-type: none"> red-brown (1) liquid (1) 	<p>allow dark red</p> <p>(mark independently)</p>	(2)

Question number	Answer	Acceptable answers	Marks
6 (a) (iii)	<p>A description to include</p> <ul style="list-style-type: none"> (indicator) turns red (1) (solution) is acidic (1) 	<p>accept other colours such as yellow and orange showing $\text{pH} < 7$</p> <p>allow $\text{pH} < 7$</p>	(2)

Question number	Answer	Marks
6 (b)	<p>C They are good conductors of electricity</p> <p>The only correct answer is C</p> <p>A is not correct because transition metals have high melting points</p> <p>B is not correct because transition metals are more dense than water</p> <p>D is not correct because not all transition metals are magnetic</p>	(1)

Question Number		Indicative Content	Mark
QWC	*6(c)	<p>A description to include some of the following points</p> <p>similarities</p> <ul style="list-style-type: none"> • move about • bubbles formed • heat given out • hydrogen produced / metal + water → metal hydroxide + hydrogen • metal hydroxide solution formed / metal + water → metal hydroxide + hydrogen • purple solution if universal indicator present (accept suitable colour for other indicators) <p>differences</p> <ul style="list-style-type: none"> • lithium, sodium and potassium float on water, rubidium and caesium sink • reactivity increases down the group • lithium slowly disappears • sodium forms a ball / melts • potassium burns with a lilac flame • rubidium burns with coloured flame • caesium explosive 	(6)
Level	0	No rewardable content	
1	1 - 2	<ul style="list-style-type: none"> • A limited description of at least one metal reacting with water e.g. sodium floats on water • the answer communicates ideas using simple language and uses limited scientific terminology • <u>spelling, punctuation and grammar are used with limited accuracy</u> 	
2	3 - 4	<ul style="list-style-type: none"> • A simple description of some relevant similarities or differences involving a limited number of these metals OR similarities between all metals OR differences between all metals • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • <u>spelling, punctuation and grammar are used with some accuracy</u> 	
3	5 - 6	<ul style="list-style-type: none"> • A detailed explanation of some similarities and differences of all three metals reacting with water including several relevant observations or suggesting how rubidium and / or caesium would behave • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • <u>spelling, punctuation and grammar are used with few errors</u> 	

(Total for Question 6 = 12 marks)

