PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

CHEMISTRY



MARK SCHEME

TOPIC 1: KEY CONCEPTS IN CHEMISTRY: COVALENT BONDING (PAPER 2)

SCORE	PERCENTAGE
/93	%

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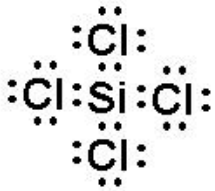
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Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
(i)	 all **four** bond pairs (1) rest of molecule correct (1)	MP2 dependent on MP1 electrons may be shown as dots or crosses or any combination electrons can be shown in any overlapping part of intersecting shells allow atoms unlabelled ignore inner shells, whether correct or otherwise	**(2)** AO2-1

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking • weak forces **between molecules/ intermolecular forces** (1) • little {**heat** / **energy**} needed (1)	MP2 can score even if MP1 not scored allow **intermolecular** bonds / bonds **between molecules** reject forces between {atoms / bonds / ions} for MP1 only ignore **less** energy needed / 'easy' to break ignore low temperature	**(2)** AO1-1

(**QU05a 1SC0/1CH, June 2024**)

Q2.

	Answer	Acceptable answers	Mark
(a)	C smaller than the mass of a proton		**(1)**
(b)	An description linking • 8 protons (1) • (and) {17-8/9} neutrons (1)	ignore references to electrons in shells / charges on particles if electrons in nucleus max 1 protons and neutrons with incorrect numbers (1)	**(2)**
(c)	Explanation linking • (both have) same number (of electrons) in outer shell(1) • 6 (electrons in outer shell)	correct electronic configurations or diagrams alone max 1 'they both have 6 in the outer shell' scores both marks allow 'both need 2	**(2)**

	(consequent on first point) (1)	(more) (electrons) to fill outer shell' for both marks	
(d)	A description to include • 2.8 (in 1st and 2nd shell)(1) • 5 (in outer shell)(1)	suitable diagram in place of 2.8(1).5(1) electrons in {shells / orbits / rings}(1)	**(2)**
(e)(i)	A description to include • electron(s) shared (1) • {**pair(s) of / two**} (electrons) (1)	can be shown in a diagram of a covalent bond any mention of ions scores zero	**(2)**
(e)(ii)	P_2O_5	Reject P2O5 / P^2O^5	**(1)**

(**Q46 1SC0/1CH, June 2013**)

Q3.

	Answer	Acceptable answers	Mark
(a)	C smaller than the mass of a proton		**(1)**
(b)	An description linking • 8 protons (1) • (and) {17-8/9} neutrons (1)	 ignore references to electrons in shells / charges on particles if electrons in nucleus max 1 protons and neutrons with incorrect numbers (1)	**(2)**
(c)	Explanation linking • (both have) same number (of electrons) in outer shell(1) • 6 (electrons in outer shell) (consequent on first point) (1)	correct electronic configurations or diagrams alone max 1 'they both have 6 in the outer shell' scores both marks allow 'both need 2 (more) (electrons) to fill outer shell' for both marks	**(2)**
(d)	A description to include • 2.8 (in 1st and 2nd shell)(1) • 5 (in outer shell)(1)	suitable diagram in place of 2.8(1).5(1) electrons in {shells / orbits / rings}(1)	**(2)**
(e)(i)	A description to include • electron(s) shared (1) • {**pair(s) of / two**} (electrons) (1)	can be shown in a diagram of a covalent bond any mention of ions scores zero	**(2)**
(e)(ii)	P_2O_5	Reject P2O5 / P^2O^5	**(1)**

(**Q43 1SC0/2CH, June 2013**)

Q4.

Question Number	Answer	Additional guidance	Mark
(i)	A description to include • shared **electron**(s) (1) • {a pair of / two} (**electrons**) (1)	allow a diagram for both mark points reference to ionic bonding/ions scores 0 e.g. gains two electrons = 0	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
(ii)	An explanation linking any two from • intermolecular forces / forces **between** molecules (1) • (intermolecular) forces {weak / take little energy to break}/ little energy to separate molecules (1) • boiling point is below room temperature / has a low boiling point (1)	if answer relates to the breaking of any type of **bond** first two marking points cannot be scored (but 3rd could) allow "attractions" instead of "forces"	**(2)** AO 1 1

(**Q22 1SC0/2CF, June 2018**)

Q5.

Question Number	Answer	Additional guidance	Mark
(i)	A description to include • shared **electron**(s) (1) • {a pair of / two} (**electrons**) (1)	allow a diagram for both mark points reference to ionic bonding/ ions scores 0 *e.g.* gains two electrons = 0	**(2)** AO 1 1

Question Number	Answer	Additional guidance	Mark
(ii)	An explanation linking any two from • intermolecular forces / forces **between** molecules (1) • (intermolecular) forces {weak / take little energy to break}/ little energy to separate molecules (1) • boiling point is below room temperature / has a low boiling point (1)	if answer relates to the breaking of any type of **bond** first two marking points cannot be scored (but 3rd could) allow 'attractions' instead of 'forces'	**(2)** AO 1 1

(**Q06 1SC0/2CH, June 2018**)

Q6.

Question Number	Answers	Acceptable Answers	Mark
(a)(i)	<table><tr><td></td><td>chlorine-35</td><td>chlorine-37</td></tr><tr><td>number of protons</td><td>**17**</td><td>**17**</td></tr><tr><td>number of neutrons</td><td>**18**</td><td>**20**</td></tr><tr><td>number of electrons</td><td>**17**</td><td>**17**</td></tr></table> the four 17s (1) the 18 and 20 (1)		**(2)**

Question Number	Answers	Acceptable Answers	Mark
(a)(ii)	An explanation linking M1 average (mass of atoms/isotopes present) (1) M2 more chlorine-35 than chlorine-37 / higher {percentage / abundance} of Cl-35 / lower {percentage / abundance} of Cl-37 / (1)	 mean ignore weight 75% chlorine-35 / 25% chlorine-37/ chlorine-35 and chlorine-37 in ratio 3:1 / correct calculation to obtain 35.5 (2) eg[(75x35) + (25x37)]/100	**(2)**

Question Number	Answers	Acceptable Answers	Mark
(b)	Diagram showing one carbon and four chlorines four pairs of electrons shared between the carbon and chlorine atoms (1) fully correct (1)	use of dots or crosses or mixture of both ignore inner shells even if incorrect ignore symbols	**(2)**

Question Number		Indicative Content	Mark
QWC	*** (c)**	A response including some of the following points Note: (carbon to carbon) strong bonds is given in question Diamond: Uses and Properties • in cutting tools/engraving • drill bit • jewellery • diamond very hard/strong • attractive/lustrous • high melting point Explanations • giant molecular/covalent • each carbon atom bonded to four other carbon atoms • three dimensional structure • to break it lots of bonds would need to be broken • would need lot of energy/force Graphite: Uses and Properties • to make electrodes • a lubricant • sporting equipment • in pencils/drawing • graphite conducts electricity • soft Explanations • giant molecular/covalent • each carbon atom bonded to three other carbon atoms • each carbon atom has a free electron • delocalised electrons • (delocalised) electrons move to carry current • layers of carbon atoms • weak forces/bonds between layers/sheets • so layers/sheets can slide/rub off or over each other	**(6)**

Level	0	No rewardable content
1	1 - 2	• a limited description eg for either diamond ***or*** graphite states a correct Use ***or*** Property • 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/explanation eg for ***both*** diamond ***and*** graphite states a correct Use ***or*** Property linked with at least **one relevant** explanation point **OR** for ***either*** diamond ***or*** graphite States a correct Use or Property linked to at least **two relevant** explanation points • 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 eg for ***both*** diamond ***and*** graphite States a correct Use or Property linked to at least **three relevant** explanation points (in total) **OR** for ***either*** diamond ***or*** graphite States a correct Use or Property linked to at least **four relevant** explanation points (in total) • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

(**Q06 1SC0/1CH, June 2014**)

Q7.

Question Number	Answers	Acceptable Answers	Mark
(a)(i)	<table><tr><td></td><td>chlorine-35</td><td>chlorine-37</td></tr><tr><td>number of protons</td><td>**17**</td><td>**17**</td></tr><tr><td>number of neutrons</td><td>**18**</td><td>**20**</td></tr><tr><td>number of electrons</td><td>**17**</td><td>**17**</td></tr></table> the four 17s (1) the 18 and 20 (1)		**(2)**

Question Number	Answers	Acceptable Answers	Mark
(a)(ii)	An explanation linking M1 average (mass of atoms/isotopes present) (1) M2 more chlorine-35 than chlorine-37 / higher {percentage / abundance} of Cl-35 / lower {percentage / abundance} of Cl-37 / (1)	 mean ignore weight 75% chlorine-35 / 25% chlorine-37/ chlorine-35 and chlorine-37 in ratio 3:1 / correct calculation to obtain 35.5 (2) eg[(75x35) + (25x37)]/100	**(2)**

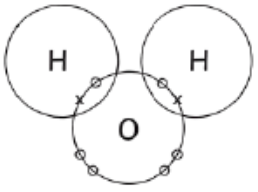
Question Number	Answers	Acceptable Answers	Mark
(b)	Diagram showing one carbon and four chlorines four pairs of electrons shared between the carbon and chlorine atoms (1) fully correct (1)	use of dots or crosses or mixture of both ignore inner shells even if incorrect ignore symbols	**(2)**

Question Number		Indicative Content	Mark
QWC	*** (c)**	A response including some of the following points Note: (carbon to carbon) strong bonds is given in question Diamond: Uses and Properties • in cutting tools/engraving • drill bit • jewellery • diamond very hard/strong • attractive/lustrous • high melting point Explanations • giant molecular/covalent • each carbon atom bonded to four other carbon atoms • three dimensional structure • to break it lots of bonds would need to be broken • would need lot of energy/force Graphite: Uses and Properties • to make electrodes • a lubricant • sporting equipment • in pencils/drawing • graphite conducts electricity • soft Explanations • giant molecular/covalent • each carbon atom bonded to three other carbon atoms • each carbon atom has a free electron • delocalised electrons • (delocalised) electrons move to carry current • layers of carbon atoms • weak forces/bonds between layers/sheets • so layers/sheets can slide/rub off or over each other	**(6)**

Level	0	No rewardable content
1	1 - 2	• a limited description eg for either diamond ***or*** graphite states a correct Use ***or*** Property • 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/explanation eg for ***both*** diamond ***and*** graphite states a correct Use ***or*** Property linked with at least **one relevant** explanation point **OR** for ***either*** diamond ***or*** graphite States a correct Use or Property linked to at least **two relevant** explanation points • 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 eg for ***both*** diamond ***and*** graphite States a correct Use or Property linked to at least **three relevant** explanation points (in total) **OR** for ***either*** diamond ***or*** graphite States a correct Use or Property linked to at least **four relevant** explanation points (in total) • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors

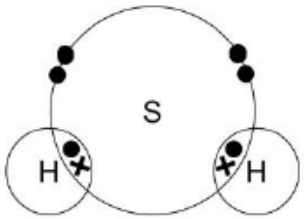
(**Q05 1SC0/2CH, June 2014**)

Q8.

Question number	Answer	Additional guidance	Mark
	 (2) OR shared pair of electrons between the oxygen and a hydrogen (1) rest of molecule correct (1)	allow dots or crosses or a mixture of both	**(2)** **AO1**

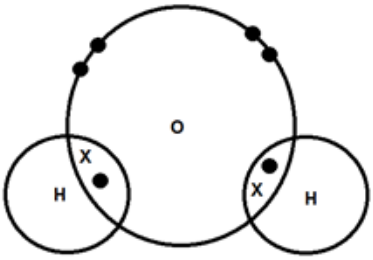
(**Q04c 1SC0/2CF, Nov 2021**)

Q9.

Question number	Answer	Additional guidance	Mark
	 shared pair (1) rest of molecule correct (1)	allow all dots or all crosses or a mixture of both allow remaining electrons not shown as pairs MP2 depends on MP1	**(2)** **AO2-1**

(**QU01c 1SC0/2CF, June 2023**)

Q10.

Question Number	Answer	Additional guidance	Mark
	 (2)	shared pair of electrons in right hand overlap(1) rest of molecule with 4 electrons drawn in outer shell of O only (1) MP2 dependent on MP1 allow x or • or combinations thereof for any electrons ignore inner shells of electrons even if incorrect	**(2)**

(**Q05e 1SC0/1CF, June 2019**)

Q11.

Question number	Answer	Additional guidance	Mark
	A description to include ionic (max 2 marks) • (electrostatic) force between (oppositely charged) ions / between anions and cations (2) covalent (max 2 marks) • atoms share a **pair** of electrons (2)	Other creditable responses (max 1 mark) including any **one** from: • {ions / cations / anions} are charged particles • ionic bonds between metals and non-metals • electrons transferred (from metal to non-metal) • metals lose electrons / non-metals gain electrons reject electrons transferred from non-metal to metals Other creditable responses (max 1 mark) including any **one** from: • covalent bonds are formed when electron(s) are shared • covalent bonds form molecules • covalent bonds between non-metals	**AO1-1 (4)**

(**Q04d 1SC0/1CF, June 2023**)

Q12.

Question number	Indicative content	Mark
*	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. The indicative content below is not prescriptive and candidates are not required to include all the material that is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO1 (3 marks) and AO2 (3 marks)** • they show methane contains carbon and hydrogen • structure **A** only shows the ratio of C:H (as 1:4) • structure **A** gives no information about bonding in molecule • structure **A** gives no information about shape of molecule • dot & cross diagram, **B**, shows the covalent bonding between the C and H atoms • single bonds, show in structures **B**, **C** and **D** • inner shell not involved in bonding • structure **B** does not show the 3-D positions of atoms • single lines used to show single covalent bonds in structure **C** • only a 2-D representation and not positions in space • ball & stick model, **D**, shows position in space / 3-D arrangement • atoms not actually connected by the sticks • space-filling, structure **E**, model shows 3-D arrangement of atoms • **E** shows approximate relative sizes occupied by separate atoms • no information about type of bond between atoms in structure **E**	**(6)** AO1-1 AO2-1

Level	Mark	Additional Guidance	General additional guidance - the decision between levels
	0	No rewardable material.	Read whole answer and ignore all incorrect material/ discard any contradictory material then:
Level 1	1-2	<u>Additional Guidance</u> Makes simple statements about the models that are not explained or linked. OR Gives a description of at least one model OR Identifies limitations of at least one model	<u>Possible Candidate Responses</u> • the models show that methane contains 1 carbon and 4 hydrogen atoms • model A gives no information about the structure of the molecule • model B is a dot and cross diagram showing shared pairs of electrons between carbon and hydrogen • a detailed description of one model scores the upper part of the level
Level 2	3-4	<u>Additional Guidance</u> Gives different descriptions of at least three models OR Gives a description of at least two models and links at least one model to its limitations OR Identifies different limitations of at least three models	<u>Possible Candidate Responses</u> • model B is a dot and cross diagram showing the covalent bonds. Model D is a ball and stick model showing a 3D model. All models show that methane contains one carbon and four hydrogen atoms. • model E shows the relative sizes of carbon and hydrogen atoms but gives no detail about the bonding between the atoms. Model C shows single covalent bonds. • model A gives no information about how the atoms are arranged in methane, and models B and C give no information about how the atoms are arranged in space and model E gives no information about the bonds. • detailed descriptions in all cases score the upper part of the level

Level 3	5-6	Additional Guidance Gives a description of at least three models AND three limitations OR Gives a description of all five models AND at least one limitation for one of the models	Possible Candidate Responses • model C shows the displayed formula and single bonds in methane but is only a 2D model and does not show the position of the atoms in space. Model A is the molecular formula and tells us how many carbon and hydrogen atoms are in the molecule but gives no information about how these are arranged. Model D shows the 3D arrangement of atoms, but model E does not show how the atoms are bonded.

Level	Mark	Descriptor
	0	• No awardable content
Level 1	1-2	• Demonstrates elements of chemical understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. (AO2)
Level 2	3-4	• Demonstrates chemical understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. (AO2)
Level 3	5-6	• Demonstrates accurate and relevant chemical understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. (AO2)

(**QU05d 1SC0/1CH, June 2022**)

Q13.

Question number	Answer	Additional guidance	Mark
	• {1 pair of/two} electrons shared between two fluorine atoms (1) • rest of structure correct (1)	ignore inner shells	**(2)**

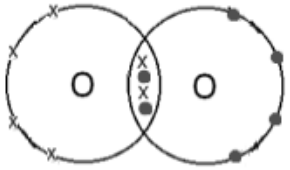
(**Q05b 1SC0/2CF/S2, SAM**)

Q14.

Question number	Answer	Additional guidance	Mark
	• {1 pair of/two} electrons shared between two fluorine atoms (1) • rest of structure correct (1)	ignore inner shells	**(2)**

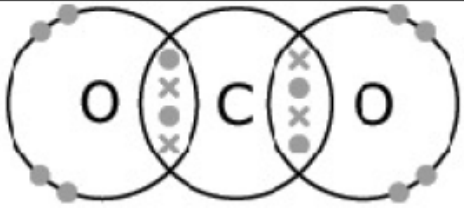
(**Q01b 1SC0/2CH/S2, SAM**)

Q15.

Question Number	Answer	Additional guidance	Mark
	 (2)	double bond (1) rest of molecule (1) (dependent on correct double bond) ignore atomic symbol allow all x or ● ignore inner shells of electrons even if incorrect	**(2)** AO 1 1

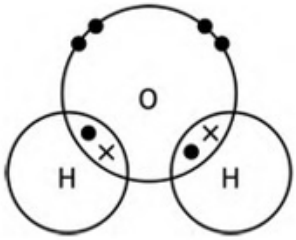
(**Q15 1SC0/1CH, June 2018**)

Q16.

Question number	Answer	Additional guidance	Mark
	 (2) or • CO_2 with one correct double bond (1) • rest of structure correct (1)	ignore any inner electrons shown remaining electrons on oxygen either singly or paired allow all dots or all crosses 2nd mark dependent on 1st	2

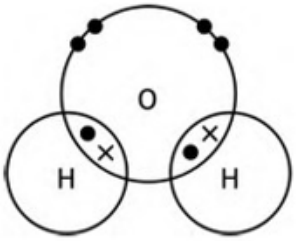
(**Q02c 1SC0/1CH, Nov 2020**)

Q17.

Question number	Answer	Additional guidance	Mark
	 a shared pair of electrons (1) rest of molecule correct including correct atomic symbols, if given (1)	allow all dots / all crosses allow unlabelled atoms ignore inner electrons even if incorrect if no circles present, atomic symbols must be present ignore double / triple bonds MP2 depends on MP1	**AO1 1 (2)**

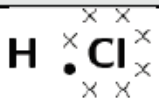
(**QU06b 1SC0/2CF, June 2025**)

Q18.

Question number	Answer	Additional guidance	Mark
	 a shared pair of electrons (1) rest of molecule correct including correct atomic symbols, if given (1)	allow all dots / all crosses allow unlabelled atoms ignore inner electrons even if incorrect if no circles present, atomic symbols must be present ignore double / triple bonds MP2 depends on MP1	**(2)** **AO1-1**

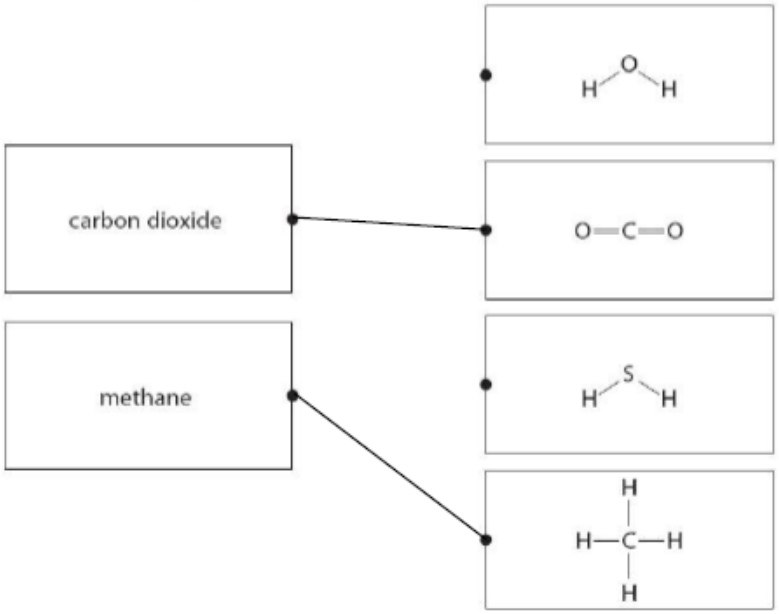
(**QU02b 1SC0/2CH, June 2025**)

Q19.

Question number	Answer	Additional guidance	Mark
	 • One shared pair of electrons in molecule (1) • Rest of molecule correct, conditional on shared pair (1)	Allow any combination of dots and crosses.	**(2)**

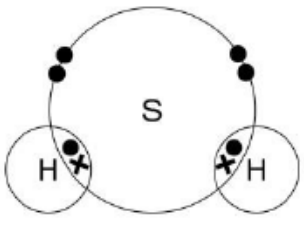
(**Q02d 1SC0/2CF, SAM 2016**)

Q20.

Question number	Answer	Additional guidance	Mark
	name of compound / structure of molecule  one mark for each line	do not award mark if more than one line join a left hand box with those on the right	(2) AO1-1

(**QU01b 1SC0/2CF, June 2023**)

Q21.

Question number	Answer	Additional guidance	Mark
	 (2) OR one shared pair of electrons between S atom and each of two H atoms (1) rest of molecule correct (1)	for any marks must be molecule with two H and one S atom, but ignore shape/ bond angles unlabelled atoms can be assumed to be H and S max 1 mark if charge on molecule allow dots or crosses or a mixture of both allow with no circles ignore inner shells even if incorrect MP2 dependent on MP1	(2) AO2-1

(**QU03b 1SC0/2CH, June 2023**)

Q22.

	Answer	**Acceptable answers**	**Mark**
(a)(i)	fractional distillation		**(1)**
(a)(ii)	to make it liquid	liquefy/condense to remove water (vapour) to remove carbon dioxide	**(1)**
(b)	D weak forces of attraction between the oxygen molecules		**(1)**
(c)(i)	An description including • shared (electrons) (1) • pair(s) of electrons (between atoms) (1)	Ignore reference to complete/full shells Ignore reference to between two metals Ignore reference to between metal and non-metal Ignore reference to between molecules Any reference to between ions scores 0	**(2)**
(c)(ii)	2.4		**(1)**
(c)(iii)	diagram showing • any shared pair of electrons between a carbon and oxygen atom in CO_2 molecule (1) • rest of molecule correct (1)	Must have O C O arrangement If any atom labelled must be correct Ignore inner electrons even if wrong electrons can be on/in ring or no ring Ignore intersecting circles Accept all permutations of dots and crosses	**(2)**

(**Q12 1SC0/1CH, June 2013**)

Q23.

	Answer	**Acceptable answers**	**Mark**
(a)(i)	fractional distillation		**(1)**
(a)(ii)	to make it liquid	liquefy/condense to remove water (vapour) to remove carbon dioxide	**(1)**

(b)	D weak forces of attraction between the oxygen molecules		**(1)**
(c)(i)	An description including • shared (electrons) (1) • pair(s) of electrons (between atoms) (1)	Ignore reference to complete/full shells Ignore reference to between two metals Ignore reference to between metal and non-metal Ignore reference to between molecules Any reference to between ions scores 0	**(2)**
(c)(ii)	2.4		**(1)**
(c)(iii)	diagram showing • any shared pair of electrons between a carbon and oxygen atom in CO_2 molecule (1) • rest of molecule correct (1)	Must have O C O arrangement If any atom labelled must be correct Ignore inner electrons even if wrong electrons can be on/in ring or no ring Ignore intersecting circles Accept all permutations of dots and crosses	**(2)**

(**Q02 1SC0/2CH, June 2013**)

Q24.

Question number	Answer	Additional guidance	Mark
	CH_4	allow H_4C / C_1H_4 reject CH4 / H4C / CH^4 / Ch_4 / ch_4	**(1)** **AO3-1**

(**QU01a 1SC0/2CF, June 2023**)

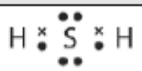
Q25.

Question number	Answer	Mark
(i)	B 	(1)

Question number	Answer			Mark
(ii)	C	low	low	poor conductor	(1)

(**Q04c 1SC0/1CF, SAM**)

Q26.

Question number	Answer	Mark
(i)	B 	(1)

Question number	Answer	Mark
(ii)	C low low poor conductor	(1)

(**Q01a 1SC0/1CH, SAM**)

Q27.

	Answer	Acceptable answers	Mark
(i)	An description including • shared (electrons) (1) • pair(s) of electrons (between atoms) (1)	Ignore reference to complete/full shells Ignore reference to between two metals Ignore reference to between metal and non-metal Ignore reference to between molecules Any reference to between ions scores 0	**(2)**
(ii)	2.4		**(1)**
(iii)	diagram showing	Must have O C O arrangement	**(2)**

	• any shared pair of electrons between a carbon and oxygen atom in CO_2 molecule (1) • rest of molecule correct (1)	If any atom labelled must be correct Ignore inner electrons even if wrong electrons can be on/in ring or no ring Ignore intersecting circles Accept all permutations of dots and crosses	

(**Q20 1SC0/1CH, June 2013**)

Q28.

	Answer	**Acceptable answers**	**Mark**
(i)	An description including • shared (electrons) (1) • pair(s) of electrons (between atoms) (1)	Ignore reference to complete/full shells Ignore reference to between two metals Ignore reference to between metal and non-metal Ignore reference to between molecules Any reference to between ions scores 0	**(2)**
(ii)	2.4		**(1)**
(iii)	diagram showing • any shared pair of electrons between a carbon and oxygen atom in CO_2 molecule (1) • rest of molecule correct (1)	Must have O C O arrangement If any atom labelled must be correct Ignore inner electrons even if wrong electrons can be on/in ring or no ring Ignore intersecting circles Accept all permutations of dots and crosses	**(2)**

(**Q11 1SC0/2CH, June 2013**)

Q29.

Question number	Answer	Mark
	B	(1)

(**Q01cii 1SC0/1CF, SAM 2016**)

Q30.

	Answer	Acceptable answers	Mark
(i)	A description to include • electron(s) shared (1) • {**pair(s) of / two**} (electrons) (1)	 can be shown in a diagram of a covalent bond any mention of ions scores zero	**(2)**
(ii)	P_2O_5	Reject P2O5 / P^2O^5	**(1)**

(**Q21 1SC0/1CF, June 2013**)

Q31.

	Answer	Acceptable answers	Mark
(i)	A description to include • electron(s) shared (1) • {**pair(s) of / two**} (electrons) (1)	 can be shown in a diagram of a covalent bond any mention of ions scores zero	**(2)**
(ii)	P_2O_5	Reject P2O5 / P^2O^5	**(1)**

(**Q17 1SC0/2CF, June 2013**)

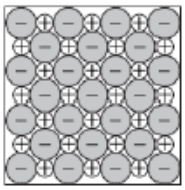
Q32.

Question number	Answer	Additional guidance	Mark
(i)	Left side: sodium + chlorine (1) Right side: sodium chloride (1)	reactants in either order reject chlor**ide** on left hand side reject sodium chlor**ine** on right hand side reject if other substances on right side use of formulae to produce a correctly balanced equation: $2Na + Cl_2 \rightarrow 2NaCl$ (2)	**(2)** **AO2-1**

Question number	Answer	Additional guidance	Mark
(ii)	A description to include • (two or more) atoms joined together (1) • by a {covalent bond / shared pair of electrons} (1)	 allow made up of more than one atom / group of atoms ignore 'compound atoms' MP2 depends on MP1 allow {(chemically) bonded / chemically joined} together reject references to ionic bonding for MP2 if no other mark scored, allow 'particles joined by a {covalent bond / shared pair of electrons} (1)	**(2)** **AO1-1**

Question number	Answer	Additional guidance	Mark
(iii)	An explanation linking • electrons (1) • (electrons) {can move / are delocalised / can pass through / can flow} (1)	 reject ions MP2 depends on MP1 allow charged particles can move / are delocalised (1) ignore 'free' alone allow free-moving electrons / delocalised electrons / free flowing electrons (2)	**(2)** **AO2-1**

Question number	Answer	Additional guidance	Mark
(iv)	NaCl / Na^+Cl^-	allow ClNa ignore upper case A, upper case L, lower case n ignore numbers in front of formula reject $Na^+ + Cl^-$ as final answer / Na^-Cl^+	**(1)** **AO3-1**

Question number	Answer	Mark
(v)	**D**  is the only correct answer **A**, **B** and **C** represent different structure types	**(1)** **AO2-1**

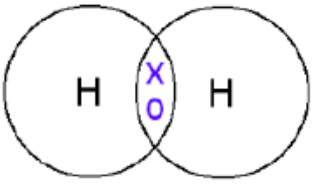
Question number	Answer	Additional guidance	Mark
(vi)	ammeter / (light) bulb / lamp	allow buzzer / multimeter allow correct symbol (on diagram) ignore voltmeter / data logger (alone) ignore 'add arrows'	**(2)** **AO3-3**

(**QU04b 1SC0/2CF, June 2023**)

Q33.

Question number	Answer	Additional guidance	Mark
(i)	sodium + hydrochloric acid (1) → sodium chloride + hydrogen (1)	allow reactants either way round allow products either way round reject 'sodium chlorine' allow $Na + HCl \rightarrow NaCl + H_2$ (1) $2Na + 2HCl \rightarrow 2NaCl + H_2$ (2)	**2**

Question number	Answer	Mark
(ii)	**B** flammable **A** corrosive has a different hazard symbol **C** oxidising has a different hazard symbol **D** toxic has a different hazard symbol	**1**

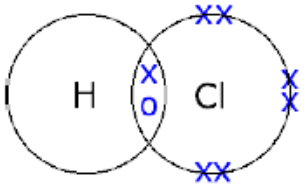
Question number	Answer	Additional guidance	Mark
(iii)		allow dots or crosses or mixture allow other suitable symbols	**1**

(**Q01b 1SC0/1CF, Nov 2020**)

Q34.

Question number	Answer	Additional guidance	Mark
(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
(ii)	(turns) red /pink	(1)

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

(**Q03b 1SC0/2CF, Nov 2020**)