PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

CHEMISTRY



MARK SCHEME

TOPIC 6: GROUPS IN THE PERIODIC TABLE: GROUP 0 (PAPER 2)

SCORE	PERCENTAGE
/39	%

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(**Q02a 1SC0/2CF, Nov 2021**)

Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
(i)	An explanation linking: • it has **two** electrons in outer shell/ it has a **full** outer shell / OWTTE (1) • so does not {gain/ lose/ transfer/ share} **electrons** (1)	MP1 – reject if number of electrons in outer shell is stated and not 2 ignore references to protons and neutrons allow helium has **two** electrons in its (only) shell / helium's (only) shell is full ignore helium does not need to react	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(ii)	less dense than air	allow less dense than nitrogen allow low density / not (very) dense allow diffuses slowly out of balloon ignore less dense than oxygen ignore it is a gas / light / lightweight / inert/ unreactive/ non-flammable / lighter than air / makes balloon float / it rises/ it floats ignore non-toxic / not poisonous	**(1)** **AO2 1**

(**QU02d 1SC0/2CH, June 2022**)

Q2.

Question number	Answer	Additional guidance	Mark
(i)	neon bar correct (1) argon bar correct (1)	 if no other mark scored, allow 1 for neon -252 **and** argon -192	**(2)** **AO2**

Question number	Answer	Mark
(ii)	allow any value from -152 to -90	**(1)** **AO1**

(**Q02c 1SC0/2CF, Nov 2021**)

Q3.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	D the transition metals		**(1)**

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	D malleable		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	non-flammable		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	has a low density		**(1)**

Question Number	Answer	Acceptable answers	Mark
(c)(i)	A description including (yellow-) green (1) gas (1)	 any shade of green do not allow just 'yellow' do not allow green in combination with other colours eg blue-green	 **(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(ii)	hydrogen + chlorine → hydrogen chloride lhs (1) rhs (1) Ignore formulae in addition to all of the names	if formulae are used, do not allow h or CL or superscripts $H_2 + Cl_2$ on lhs 2HCl on rhs reactants in either order do not allow a mixture of words and formulae for both marks eg $H_2 + Cl_2$ → hydrogen chloride scores 1 mark for rhs do not allow hydrochloric acid /hydrochloride/hydrogen chlorine	**(2)**

(Total for Question = 8 marks)

(**Q01 1SC0/2CF, June 2014**)

Q4.

Question Number	Answer	Additional guidance	Mark
	An explanation linking the points in one of the pairs **EITHER** • argon is {inert / a noble gas} OR **argon** has /atoms have) {full / 8 electrons in} outer shell (1) • so (it) does not react (with metal filament) OR (argon/atoms) do not {gain / lose / share electrons} **OR** • **oxygen** is reactive (1) • (air/oxygen) reacts with metal filament / forms metal oxide (1)	 so metal does not burn/ combust (in argon) so (argon) does not {burn / combust} with metal (filament) so (argon) {is unreactive / less reactive / not very reactive / inactive } (with metal filament) ignore air for MP1 here allow metal burns	**(2)**

(**Q02e 1SC0/2CF, June 2019**)

Q5.

Question number	Answer	Additional guidance	Mark
(i)	An explanation linking: • it has **two** electrons in outer shell/ it has a **full** outer shell / OWTTE (1) • so does not {gain/ lose/ transfer/ share} **electrons** (1)	MP1 – reject if number of electrons in outer shell is stated and not 2 ignore references to protons and neutrons allow helium has **two** electrons in its (only) shell/ helium's (only) shell is full ignore helium does not need to react	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(ii)	less dense than air	allow less dense than nitrogen allow low density / not (very) dense allow diffuses slowly out of balloon ignore less dense than oxygen ignore it is a gas / light / lightweight / inert/ unreactive/ non-flammable / lighter than air / makes balloon float / it rises/ it floats ignore non-toxic / not poisonous	**(1)** **AO2 1**

(**QU06d 1SC0/2CF, June 2019**)

Q6.

Question number	Answer	Additional guidance	Mark
(i)	An explanation linking: • it has **two** electrons in outer shell/ it has a **full** outer shell / OWTTE (1) • so does not {gain/ lose/ transfer/ share} **electrons** (1)	MP1 – reject if number of electrons in outer shell is stated and not 2 ignore references to protons and neutrons allow helium has **two** electrons in its (only) shell/ helium's (only) shell is full ignore helium does not need to react	**(2)** **AO1 1**

Question number	Answer	Additional guidance	Mark
(ii)	less dense than air	allow less dense than nitrogen allow low density / not (very) dense allow diffuses slowly out of balloon ignore less dense than oxygen ignore it is a gas / light / lightweight / inert/ unreactive/ non-flammable / lighter than air / makes balloon float / it rises/ it floats ignore non-toxic / not poisonous	(1) AO2 1

(**QU06d 1SC0/2CF, June 2022**)

Q7.

Question number	Answer	Additional guidance	Mark
(i)	An explanation linking: • (the gas atoms) have full outer shell(s) (1) • so they do not {gain/ lose/ transfer/ share} electrons (1)	mark independently ignore mention of numbers of electrons allow outer orbital / outer energy level allow do not form ions ignore it does not react / does not gain a charge	(2) AO1 1

Question number	Answer	Mark
(ii)	**D** argon is unreactive is the only correct answer **A**, **B** and **C** are incorrect as they are irrelevant	(1) AO2 1

(**QU06c 1SC0/2CF, June 2024**)

Q8.

Question number	Answer	Additional guidance	Mark
(i)	An explanation linking: • (the gas atoms) have full <u>outer</u> shell(s) (1)	mark independently ignore mention of numbers of electrons allow outer orbital / outer energy level allow do not form ions	(2) AO1 1
	• so they do not {gain/ lose/ transfer/ share} electrons (1)	ignore it does not react/ does not gain a charge	

Question number	Answer	Mark
(ii)	**D** argon is unreactive is the only correct answer **A**, **B** and **C** are incorrect as they are irrelevant	(1) AO2 1

(**QU02c 1SC0/2CH, June 2024**)

Q9.

Question number	Answer	Additional Guidance	Mark
	an explanation linking • atoms have full <u>outer</u> (electron) shell (1) • (so) do not need to { gain / lose / share } **electron(s)** (1)	allow (electron) shells are full ignore hard to remove electrons	**(2)** **AO1-1**

(**QU04a 1SC0/2CH, June 2025**)

Q10.

	Answer	Acceptable answers	Mark
(i) 1	any value in range 1.45 to 2.99	any answer which, to 1 sf, is in the range	**(1)**
(i) 2	Kr	Reject KR, kr	**(1)**
(i) 3	no reaction		**(1)**

		'nothing'	
(ii)	An explanation linking any two of: • argon is {inert / unreactive} (1) • argon does not react with {metal/filament}/{metal/ filament} would react with air or oxygen / ORA (1) • atom has {eight electrons in outer shell / full (outer) shell} (1)	ignore noble gas doesn't react with anything argon does not corrode the metal ignore references to electrical conductivity	**(2)**

(**Q09 1SC0/2CF, June 2013**)

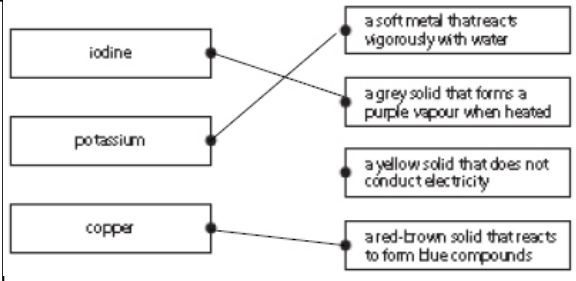
Q11.

Question number	Answer	Additional guidance	Mark
	helium, neon, argon, krypton (2)	krypton, argon, neon, helium (1) if order correct except that two adjacent elements transposed allow 1 allow formulae	**(2)**

(**Q04c 1SC0/2CH, Nov 2020**)

Q12.

	Answer	Acceptable answers	Mark
(a)	B elements		**(1)**
(b)	D alkali metals		**(1)**
(c)(i) 1	any value in range 1.45 to 2.99	any answer which, to 1 sf, is in the range	**(1)**
(c)(i) 2	Kr	Reject KR, kr	**(1)**
(c)(i) 3	no reaction	'nothing'	**(1)**
(c)(ii)	An explanation linking any two of:	ignore noble gas	**(2)**

	• argon is {inert / unreactive} (1) • argon does not react with {metal/filament}/{metal/ filament} would react with air or oxygen / ORA (1) • atom has {eight electrons in outer shell / full (outer) shell} (1)	doesn't react with anything argon does not corrode the metal ignore references to electrical conductivity	
(d)	 all 3 correct – 2 marks any two correct – 1 mark one correct – 0 marks	if two answer lines from one element, then ignore	**(2)**

(**Q01 1SC0/2CF, June 2013**)

Q13.

	Answer	**Acceptable answers**	**Mark**
(a)(i)	C cations in a sea of electrons		**(1)**
(a)(ii)	(metals have) high melting <u>point</u>	a lot of energy needed to break/overcome (metallic) bonds energy needed to break/overcome strong (metallic) bonds Ignore references to boiling point Reject reference to intermolecular forces/covalent (bonds) /attraction between ions/breaking ionic bonds/ breaking covalent bonds	**(1)**
(a)(iii)	An explanation including two of the following points		**(2)**

	• argon is inert/does not react/is unreactive (1) • because it has 8 electrons in its outer shell (1) • metals would react in/with air/oxygen (1) • argon will exclude air from welding point (1)	Ignore argon is in group 0/8 argon is a noble gas Ignore argon does not burn does not {gain/lose/share} electrons has a full outer shell (of electrons) has a stable electron configuration form (metal) oxide prevents oxidation	
(b)	$2\ Fe + 3\ Br_2 \rightarrow 2\ FeBr_3$ M1 Correct symbol/formulae (1) M2 balancing of correct symbol/formulae (1)	 Reject incorrect use of upper/lower case / subscripts for M1 but allow ECF for M2	**(2)**
(c)	C – grey solid		**(1)**
(d)	A explanation including M1 order of reactivity chlorine > bromine > iodine (1) and M2 one of the following points • chlorine displaces bromine (from bromide) AND chlorine displaces iodine (from iodide) (1) • bromine displaces iodine (from iodide) AND bromine does not displace chlorine (from chloride) (1) • iodine does not displace chlorine(from chloride) AND iodine does not displace bromine (from bromide) (1)	For M1 reject reference to reactivity of halide ions eg chlorine more reactive than bromide halogens/they decrease in reactivity down the group/table chlorine is most reactive <u>and</u> iodine is least reactive Ignore reference to displacement of halide ions eg chlorine displaces bromide Ignore "replaces" chlorine reacts with bromide AND iodide chlorine takes part in two (displacement) reactions bromine reacts with iodide AND does not react with chloride bromine takes part in one (displacement) reactions iodine does not react with chloride or bromide iodine does not take part in any (displacement) reactions	**(2)**

(**Q01 1SC0/2CH, June 2013**)

Q14.

Question number	Answer	Additional guidance	Mark
(i)	outer (electron) shell {is full / has 8 electrons}	allow orbital / energy level for shell allow (all) shell**s** are {full / complete} allow it does not need to {gain / lose / share} electrons ignore it is inert / noble gas ignore the electronic configuration	**AO3 1 (1)**

Question number	Answer	Additional guidance	Mark
(ii)	37.2 / 37 with or without working scores 2 $\frac{0.93}{100} \times 4000 = 37.2$ (2)	37.2 to any power of 10 scores 1 e.g. 3720, 37200 $\frac{0.93}{100}$ = 0.0093 (1) [x 4000 (1) = 37.2] 0.93 x 4000 = 3720 (1) [/100 (1) = 37.2] $\frac{4000}{100}$ = 40 (1) [x 0.93 (1) = 37.2] allow ecf from any of these alternatives allow **correct** rounding at any point	**AO2 1 (2)**

(**QU03d 1SC0/2CF, June 2025**)

Q15.

Question number	Answer	Mark
(i)	(outer shell is) full/ complete	(1) AO1

Question number	Answer	Additional guidance	Mark
(ii)	An explanation linking • hydrogen is flammable / could ignite (1) • krypton is more dense than air (1) • (so krypton) air ship would not float (1)	 allow krypton has a high density	(3) AO3

(**Q02a 1SC0/2CF, Nov 2021**)