

Atomic Structure Past Paper Answers AQA Chemistry GCSE -Higher

1.

question	answers	extra information	mark
1(a)	hydrogen has one proton whereas helium has two protons	accept numbers for words accept hydrogen only has one proton ignore references to groups	1
	hydrogen has one electron whereas helium has two electrons	accept hydrogen only has one electron allow helium has a full outer shell (of electrons)	1
	hydrogen has no neutrons or helium has two neutrons	if no other mark awarded, allow helium has more electrons / protons / neutrons for 1 mark	1
1(b)(i)	2 electrons on first shell and 8 electrons on outer shell		1
1(b)(ii)	they have a stable arrangement of electrons	accept they have full outer energy level/shell of electrons do not accept they have the same number of electrons in their outer energy level / shell allow they are noble gases ignore they are in group 0	1
Total			5

2.

question	answers	extra information	mark
(a)	protons (and) neutrons	both needed for 1 mark ignore p / + and n / 0 do not accept electrons	1
(b)	because the number of protons is equal to the number of electrons	allow protons and electrons balance / cancel out allow positive / + and negative / - balance / cancel out	1
(c)	because atom A has a full highest energy level or full outer shell or because atom A has a stable arrangement of electrons	it = atom A allow all the shells are full or no incomplete shell allow because atom A is in Group 0 / a noble gas	1
(d)	(atom) B / lithium / Li (and) (atom) C / sodium / Na because they have the same number/one outer electron(s)	both needed for 1 mark linked to answer for first mark accept because both need to lose one / an electron allow because (atoms) B and C are in Group 1 / the same group / are alkali metals	1 1
total			5

3.

Question	Answers	Extra information	Mark
(a)(i)	2.8.3	any sensible symbol can be used to represent an electron	1
(a)(ii)	proton(s) and neutron(s)	both needed for the mark	1
a)(iii)	number of protons is equal to number of electrons	allow positive and negative charges cancel out allow same amount of protons and electrons	1

4.

Question	Answers	Extra information	Mark	AQ / Spec. Ref.	ID
(a)(i)	2,4 drawn (as dots / crosses / e ⁻)		1	2 / 1.1.1h	E
(a)(ii)	Water (vapour) / steam	allow hydrogen oxide / H ₂ O <i>do not accept hydroxide</i>	1	1 / 1.4.3b	G
1(b)	any two pairs from: carbon dioxide (1) causes global warming (1) or carbon (particles) / soot (1) causes global dimming (1) or carbon monoxide (1) is toxic (1) or sulfur dioxide (1) causes acid rain (1)	<i>allow greenhouse effect / climate change / sea level rise / melting of polar ice caps</i> <i>allow particulates</i> <i>allow blocks out sunlight / smog / prevents plant growth / causes breathing difficulties</i> <i>allow kills plants / erosion / acidifies water</i>	4	1 / 1.4.3a/c	E
Total			6		

5.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
(a)(i)	protons	allow "protons or electrons", but do not allow "protons and electrons"	1	1 / 1.1.1g
(a)(ii)	protons plus/and neutrons		1	1 / 1.1.1g
1(b)	(because the relative electrical charges are) $- (1)$ for an electron and $+ (1)$ for a proton and the number of electrons is equal to the number of protons	allow electrons are negative and protons are positive if no other mark awarded, allow 1 mark for the charges cancel out	1 1	1 / 1.1.1d/e
1(c)	(the electronic structure of) fluorine is 2,7 and chlorine is 2,8,7 (so fluorine and chlorine are in the same group) because they have the same number of or 7 electrons in their highest energy level or outer shell	allow diagrams for the first marking point if no other mark awarded, allow 1 mark for have the same/similar properties	1 1	1+2 / 1.1.1a / 1.1.2a
1(d)	S		1	2 / 1.1.1b
(e)(i)	ions		1	1 / 1.1.3a
(e)(ii)	molecules		1	1 / 1.1.3a
Total			9	

6.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	electronic structure 2,3 drawn	allow any representation of electrons, such as, dots, crosses, or numbers (2,3)	1	AO2 1.1.1h
1(a)(ii)	nucleus		1	AO1 1.1.1c
1(a)(iii)	protons and neutrons	do not allow electrons in nucleus	1	AO1 1.1.1c/d/f
	(relative charge of proton) +1	allow positive	1	
	(relative charge of neutron) 0	allow no charge/neutral	1	
		ignore number of particles		
1(b)	too many electrons in the first energy level or inner shell	allow inner shell can only have a maximum of 2 electrons	1	AO2+AO3 1.1.1h; 1.1.2b
	too few electrons in the second energy level or outer shell	allow neon has 8 electrons in its outer shell or neon does not have 1 electron in its outer shell allow neon has a stable arrangement of electrons or a full outer shell	1	
	neon does not have 9 electrons or neon has 10 electrons	allow one electron missing allow fluorine has 9 electrons ignore second shell can hold (maximum) 8 electrons or 2,8,8 rule or is a noble gas or in Group 0 max 2 marks if the wrong particle, such as atoms instead of electrons if no other mark awarded allow 1 mark for the electronic structure of neon is 2,8	1	
Total			8	

7.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
(a)(i)	same number of protons or 12 protons in each	ignore electrons ignore it is the same element do not allow same number of neutrons	1	AO2 1.1.1f,g
(a)(ii)	(the mass number is) the sum of the protons and neutrons	ignore electrons in shells do not allow electrons in nucleus	1	AO1 AO2 1.1.1g
	(so the atoms contain) different numbers of neutrons	allow 12, 13 and 14 neutrons for two marks if no other mark awarded allow one mark for isotopes	1	
(b)(i)	3 / three		1	AO2 1.1.3a,b
(b)(ii)	7 / seven		1	AO2 1.1.3a,b

8.

question	answers	extra information	mark
(a)	two sodium atoms (react)		1
	two (bonded) chlorine atoms (react)	allow one chlorine molecule (reacts)	1
	two sodium ions and two chloride ions (are produced)	allow two molecules of sodium chloride (are produced) or two sodium chloride particles (produced)	1
b)(i)	(2x)	max 1 if candidate changes the number of electrons in the first energy level / shell	
	8x (in second energy level / shell)		1
	1x (in outer energy level / shell)		1
b)(ii)	sodium has 1 electron in its outer energy level / shell or chlorine has 7 electrons in its outer energy level / shell		1
total			6