

**Atoms, Isotopes and Atomic Models Past Paper Answers GCSE AQA**

1.

tion	Answers	Extra information	Mark	AO / Spec. Ref.
1	B		1	AO1 4.1.1.3
2	C		1	AO2 4.1.1.3
3	A		1	AO2 4.1.1.3
4	sum of protons and neutrons	allow number of protons and neutrons	1	AO1 4.1.1.5
5	between 69.5 and 70.0		1	AO2 4.1.1.6
6	Chadwick provided the evidence to show the existence of neutrons	allow Chadwick discovered neutrons	1	AO1 4.1.1.3
	(this was necessary because) isotopes have the same number of protons <b>or</b> (this was necessary because) isotopes are atoms of the same element	allow (this was necessary because) isotopes have the same atomic number  ignore isotopes have the same number of electrons	1	AO3 4.1.1.5
	but with different numbers of neutrons	allow but with different mass (numbers)	1	AO1 4.1.1.5
<b>al</b>			<b>8</b>	

2.

Question	Answers	Extra information	Mark
2.1	13 (protons)	The answers must be in the correct order.	1
	14 (neutrons)	if no other marks awarded, award 1 mark if number of protons and electrons are equal	1
	13 (electrons)		1
2.2	has three electrons in outer energy level/shell	allow electronic structure is 2.8.3	1

3.

Question	Answers	Extra information	Mark
(a)(i)	<u>same</u> number of protons <b>or</b> 12 protons in each	ignore electrons ignore it is the same element do <b>not</b> allow same number of neutrons	1
(a)(ii)	(the mass number is) the sum of the protons and neutrons	ignore electrons in shells do <b>not</b> allow electrons in nucleus	1
	(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
(b)(ii)	7 / seven		1

4.

Question	Answers	Extra information	Mark
a)(i)	electronic structure drawn	allow any representation of an electron allow 2,4	1
a)(ii)	six / 6 protons  (protons) are positively charged	do <b>not</b> allow electrons in nucleus otherwise ignore electrons do <b>not</b> allow nucleus is neutral  allow (protons are) + / +1 / 1+ ignore statements about mass  if no other mark awarded allow one mark for nucleus	1 1  1

5.

Question	Answers	Extra information	Mark
a)(i)	electronic structure 2,3 drawn	allow any representation of electrons, such as, dots, crosses, or numbers (2,3)	1
a)(ii)	nucleus		1
a)(iii)	protons and neutrons	do <b>not</b> allow electrons in nucleus	1
	(relative charge of proton) +1	allow positive	1
	(relative charge of neutron) 0	allow no charge/neutral	1
l(b)	too many electrons in the first energy level or inner shell	allow inner shell can only have a maximum of 2 electrons	1
	too few electrons in the second energy level or outer shell	allow neon has 8 electrons in its outer shell <b>or</b> 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 <b>or</b> 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

6.

Question	Answers	Extra information	Mark
(a)(i)	(mass number = 16) because there are 8 protons and 8 neutrons (in the nucleus)	accept mass number is total number of protons and neutrons for <b>1</b> mark	2
(a)(ii)	<p>same number of protons <b>or</b> both have 6 protons</p> <p><math>^{12}\text{C}</math> has 6 neutrons</p> <p><math>^{14}\text{C}</math> has 8 neutrons</p>	<p>numbers, if given, must be correct</p> <p>accept same atomic number</p> <p>accept different number of neutrons for <b>1</b> mark</p> <p>incorrect reference to electrons = <b>max 2</b> marks</p>	<p>1</p> <p>1</p> <p>1</p>

7.

Question	Answers	Extra information	Mark	AU / 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
<b>Total</b>			<b>9</b>	

8.

stion	Answers	Extra information	Mark
(a)	because this lithium atom has 3 protons and 4 neutrons mass number is total of neutrons and protons	accept protons and neutrons have a mass of 1 accept number of neutrons = 7 - 3(protons) ignore mass of electron is negligible	1 1 1
(b)	grams $^{12}\text{C}$	accept g allow carbon-12 <b>or</b> C-12 ignore hydrogen <b>or</b> H	1 1
(c)	any <b>three</b> from: <ul style="list-style-type: none"> <li>• both have 8 protons</li> <li>• <math>^{18}\text{O}</math> has 10 neutrons</li> <li>• <math>^{16}\text{O}</math> has 8 neutrons</li> <li>• both have 8 electrons</li> </ul>	max <b>2</b> if no numbers given numbers if given must be correct  accept same number of protons  } accept different number of neutrons or $^{18}\text{O}$ has two more neutrons for <b>1</b> mark  accept same number of electrons	3