

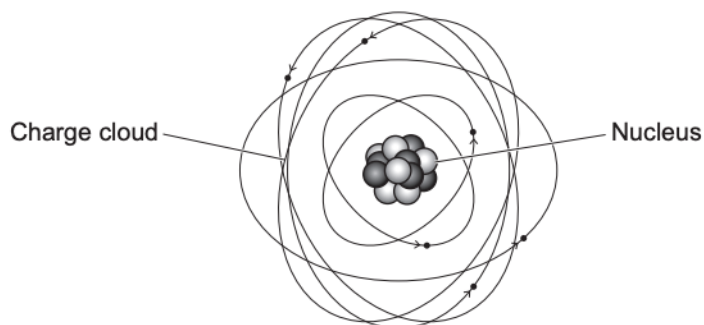
Atomic structure :

Q1. (2018)

3		D ✓	1	1.1	
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Q2. (2018)

22 Look at the diagram of an atom.



(A)

22	(a)	Electrons ✓	1	1.1	
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(B)

	(b)	Protons AND neutrons ✓	1	1.1	BOTH REQUIRED
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(C)

(c)	Idea that the relative mass of protons and neutrons is 1 ✓ and that of electrons is 0.0005 or very small (in comparison) ✓	2	2 x 1.1	ALLOW protons and neutrons have (significant) mass/more mass than electrons DO NOT ALLOW grams ALLOW mass of electron is negligible Max 1 if g used
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(D)

(d)	Any two from: Isotopes ✓ same number of protons/ same atomic number ✓ different numbers of neutrons/ different mass numbers ✓	2	2 x 1.1	DO NOT ALLOW different number of electrons ALLOW atomic mass DO NOT ALLOW relative atomic mass
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Q3. (2019)

10	D	1	1.1	
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Q4. (2019)

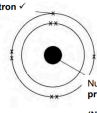
12	A	1	2.1	
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Q5. (2019)

21 All elements are made of atoms.

Atoms are made of subatomic particles.

(A)

Question	Answer	Marks	AO element	Guidance
21 (a) (i)	 <p>electron ✓</p> <p>Nucleus containing protons and neutrons ✓ (Need both for the mark)</p>	2	1.1	ALLOW either order

(ii)

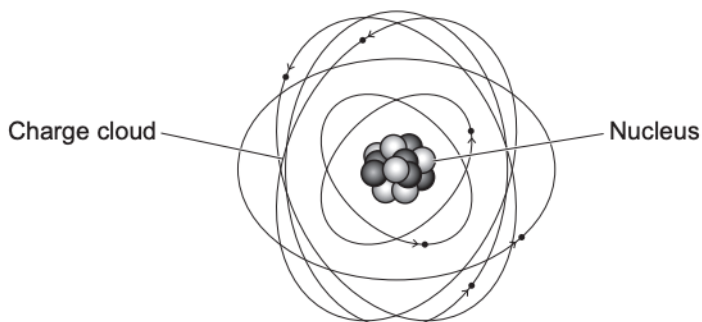
(ii)	Has equal numbers of (positive) protons and (negative) electrons ✓	1	2.1	q asks for particles IGNORE protons cancel electrons
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(B)

(b)	Isotopes have same number of protons (and electrons) ✓ Isotopes have different numbers of neutrons ✓	2	1.1	ALLOW same proton number/same atomic number ALLOW different mass number/number of nucleons/atomic mass DO NOT ALLOW different RAMM. ALLOW 1 mark for same protons and different neutrons
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Q6. (2019)

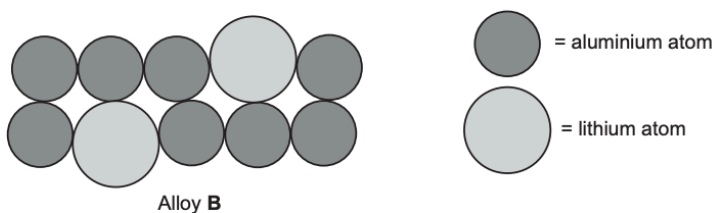
22 Look at the diagram of an atom.



(A)

(c) The scientist uses the particle model to show the elements present in alloy B.

Look at her diagram.



(c)	(i)	(Percentage of lithium =) $(2 \div 10) \times 100 = 20(\%)$ ✓	1	3.1a	
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(ii)

(ii)	<p>Idea that alloy B is only 2.2% lithium /</p> <p>Idea that alloy B is 2.2% lithium but the diagram has 20% lithium /</p> <p>Idea that the % of lithium in the alloy is much smaller than in the diagram /</p> <p>there should be 100 aluminium atoms (and 2 lithium atoms) ✓</p>	1	3.2a	<p>ALLOW ECF from incorrect percentage in (c)(i)</p> <p>ALLOW should be more Al atoms / 17.8% too large</p> <p>IGNORE references to the relative sizes of the atoms</p>
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Q7. (2020)

2	B	1	2.1	
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Q8. (2020)

3	A	1	1.1	
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Q9. (2020)

4	B	1	2.1	
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Q10. (2020)

7	B	1	2.1	
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Q11. (2020)

10	C	1	2.1	
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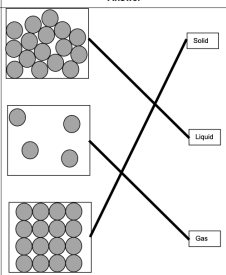
Q12. (2020)

12	B	1	2.1	
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Q13. (2020)

- 16 The particle model shows how particles are arranged and how they move in the three states of matter.

(A)

Question	Answer	Marks	AO element	Guidance
16 (a)		2	2 x 1.1	All correct = 2 marks 1 or 2 correct = 1 mark If more than one line drawn to state of matter DO NOT award the mark.
(ii)	Any one from: The particles remain the same / No new substance is made ✓ The (changed) arrangement of the particles can be reversed / The change is reversible ✓	1	1.1	ALLOW the particles only gain or lose energy

Q14. (2020)

- 23 Dmitri Mendeleev produced a Periodic Table of elements which is the basis for our modern Periodic Table. He left gaps for elements that had not been discovered yet as shown in Fig. 23.1.

I	II	III	IV	V	VI	VII
H						
Li	Be	B	C	N	O	F
Na	Mg	Al	Si	P	S	Cl
K	Ca		Ti	V	Cr	Mn
Cu	Zn			As	Se	Br
Rb	Sr	Y	Zr	Nb	Mo	
Ag	Cd	In	Sn	Sb	Te	I
Ce	Ba	La		Ta	W	
Au	Hg	Pb	Bi			

Fig. 23.1

23 (a)	Any two from: In order of (Increasing) atomic mass/weight ✓ In groups showing similar <u>chemical</u> properties ✓ Left gaps for elements that had not been discovered ✓	2	1.1	ALLOW (increasing) mass number IGNORE just in order of mass
(b)	In order of (Increasing) atomic number / proton number ✓	1	1.1	IGNORE electrons DO NOT ALLOW atomic mass

(C)

(i)

(c)	(i)	Germanium ✓	1	3.1a	
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	(ii)	Idea of similar atomic mass / 72.6 is closest to 72 / closest atomic mass ✓ Idea of similar density / 5.35 is closest to 5.5 / closest density ✓	2	2 x 3.2a	ALLOW (Relative) atomic mass of 72.6 is very close to 72 IGNORE just atomic masses are 72 and 72.6 ALLOW density of 5.35 is very close to 5.5 IGNORE just densities are 5.35 and 5.5 IGNORE comments about melting point or colour If no marks awarded ALLOW 1 for density and relative atomic mass and not melting point
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Q15. (2021)

1	D ✓	1	1.1	
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Q16. (2021)

5	C ✓	1	1.1	
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Q17. (2021)

17 Mendeleev developed an early version of the Periodic Table.

(A)

17	(a)	Any one from: Chemical properties are based on atomic number/number of protons ✓ Relative atomic mass includes neutrons / mass number is protons and neutrons, so atomic number and atomic mass order are not always consistent / AW ✓	1	1.1	
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(B)

	(b)	Any one from: Ar and K / argon and potassium ✓ Co and Ni / cobalt and nickel ✓ Te and I / tellurium and iodine ✓	1	1.1	
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(C)

(c) The diagram shows a simplified version of the modern Periodic Table. The letters, J, Q, X and Z are **not** the symbols for the elements shown.

(i)

(c)	(i)	Z ✓ Identifies element as a group 0 / 8 / 18 element / noble gas ✓	2	3.2b	
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(ii)

	(ii)	X ✓ Identifies element as a metal ✓	2	3.2b	
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Q18. (2021)

(A)

	(b)	 Lithium ion ✓ Fluoride ion ✓	2	2.2	ALLOW charges shown as 1+ or +1 for lithium; 1- or -1 for fluoride ALLOW charges given on chemical symbol ALLOW one mark for two correct electronic structures with no charges DO NOT ALLOW shared electrons All electrons can be dots or crosses
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(B)

	(c)	Idea that particles are tightly / closely packed ✓ Idea that particles have a regular arrangement / are not randomly arranged ✓	2	1.1	ALLOW marking points expressed in diagram form, for example:
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(C)

(d)	<p>Lithium fluoride has weak intermolecular forces. ☐</p> <p>Lithium fluoride can conduct electricity in the solid state. ☐</p> <p>Lithium fluoride contains metal and non-metal elements. ☒ ✓</p> <p>Lithium fluoride is a salt formed from lithium hydroxide and hydrofluoric acid. ☒ ✓</p> <p>Lithium fluoride has a low melting point. ☐</p>	2	2.1	
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Q19. (2022)

4	D ✓	1	1.1	
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Q20. (2022)

10	A ✓	1	1.1	
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Q21. (2022)

12	A ✓	1	1.1	
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Q22. (2022)

16	(a)	An atom has a nucleus with a positive ✓ charge. The nucleus is made up of protons ✓ and neutrons . ✓	3	3 x 1.1	ALLOW protons and neutrons in either order
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Q23. (2022)

(i)

(b)	(i)	<p>Boron has 11 protons. ☐</p> <p>The atomic number of boron is 5. ☒ ✓</p> <p>The electrons are heavier than the protons. ☐</p> <p>The isotopes of boron have different numbers of neutrons. ☒ ✓</p> <p>The isotopes of boron have different numbers of protons. ☐</p> <p>The mass number of boron is the same for both isotopes. ☐</p>	2	2 x 2.1	
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(ii)

	(ii)	(Boron) has three electrons in its outer shell ✓	1	2.1	
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Q24. (2022)

(c)	(Non-metals) gain electrons ✓ forms a (more stable) filled outer shell ✓	2	2 x 1.1	Ignore need electrons
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Q25. (2022)

(d)	Al^{3+} ✓	1	2.1	ALLOW Al^{+3}
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Q26. (2023)

4	B	1	1.1	
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Q27. (2023)

13	D	1	1.1	
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Q28. (2023)

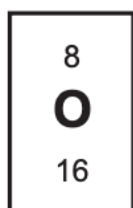
16 (a) Oxygen is a gas at room temperature.

(A)

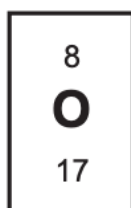
(b)	Particle	Description	✓✓	2	2 x 1.1	Any one correct = one mark All three correct = two marks
	proton	relative mass of 0.0005				
	electron	positively charged and relative mass of 1				
	neutron	no charge				

(B)

(c) The element oxygen has three different isotopes.



Isotope 1



Isotope 2



Isotope 3

(i)

(c)	(i)	(Isotope) 3 ✓	1	2.1	
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(ii)

	(ii)	(Isotope) 1 ✓	1	2.1	
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(iii)

	(iii)	8 ✓	1	2.1	
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(C)

(d)	First check the answer on answer line If answer = 0.204 (%) award 2 marks 99.759 + 0.037 OR 99.796 ✓ 100 - 99.796 = 0.204 ✓	2	2 x 2.1	
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Q29. (2024)

1	A ✓	1	1.1	
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Q30. (2024)

3	A ✓	1	1.1	
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Q31. (2024)

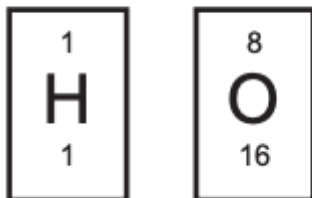
6	A ✓	1	1.1	
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Q32. (2024)

16 Water boils at 100 °C and freezes at 0 °C.

(A)

(b) Water, H_2O , contains hydrogen and oxygen atoms.



(i)

(b)	(i)	8 ✓	1	2.1	
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(ii)

	(ii)	0 ✓	1	2.1	
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(iii)

	(iii)	+1 / 1+ ✓	1	1.1	ALLOW + IGNORE positive
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