Atomic Structure

Mark Scheme 2

Level	IGCSE(9-1)
Subject	Chemistry
Exam Board	Edexcel IGCSE
Module	Double Award (Paper 1C)
Topic	Principles of Chemistry
Sub-Topic	Atomic Structure
Booklet	Mark Scheme 2

Time Allowed: **57 minutes**

Score: **/47**

Percentage: **/100**

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>90%	80%	70%	60%	50%	40%	30%	20%	10%

Question number	Expected Answer	Accept	Reject	Marks
1 (a)	**M1** both protons = 6 **M2** C-13 has 7 **and** C-14 **has** 8 (neutrons)			1 1
(b)	same electronic configuration(s) / structure(s) **OR** same <u>number</u> of electrons OR have <u>four/same number of</u> electrons in <u>outer / valence</u> shell IGNORE same number of electrons in inner shells IGNORE references to atomic number / same number of protons / different number of neutrons	amount for number / six electrons	different number of protons	1
(c) (i)	M1 the average / mean mass of an <u>atom</u> (of the element) M2 compared to / relative to ($1/12^{th}$) the mass (of an atom) of carbon-12 OR M1 mass of one mole of <u>atoms</u> M2 compared to (mass of) $1/12^{th}$ one mole **/** 1g of carbon-12	average/mean of: atomic masses / mass numbers / mass of isotope<u>s</u> on a scale where carbon-12 has a mass of 12 / compared with the mass of carbon-12 which is 12	mean mass of an element mass of one mole of the element	1 1

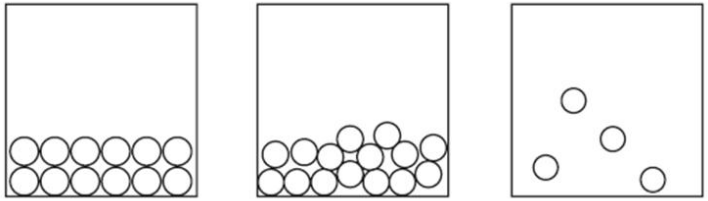
Question number	Expected Answer	Accept	Reject	Marks
1 c (ii)	M1 (12 x 98.9) + (13 x 1.1) M2 ÷ 100 M3 12.01 IGNORE units	(12 x 0.989) + (13 x 0.011) for first 2 marks 12.011 on its own for 2 marks 12.01 on its own for 3 marks		1 1 1

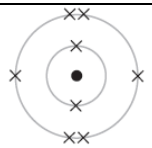
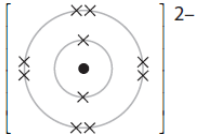
Question number	Answer	Notes	Marks
2 (a)	electron(s)		1
(b)	electron(s)		1
(c) (i)	protons (and) electrons	Accept in either order both answers	1
(ii)	protons		1
	neutrons		1
(d) (i)	12		1
(ii)	24		1
(iii)	2.8.2	Accept any other punctuation marks, such as , /) — and no punctuation marks	1

Total 8 marks

Question number	Answer	Notes	Marks
3 (a)	3		1
(b)	ammonia / NH_3 hydrogen chloride / HCl	Do not accept ammonium Do not accept hydrochloric acid Accept in either order. If name and formula given, both must be correct. Ignore state symbols, except HCl (aq)	1 1
(c)	ammonium chloride / NH_4Cl	Do not accept ammonia chloride. If name and formula given, both must be correct.	1
(d)	cross in box 2 (decomposition) cross in box 4 (neutralisation)		1 1

Total 6 marks

Question number			Answer	Notes	Marks
4	a		 ☐ ☐ ☒		1
	b	i	A (an electron)		1
		ii	B (a neutron)		1
		iii	B (electrons and protons)		1
	c		isotopes		3
			atomic numbers		
			mass numbers		
					Total 7 marks

Question number	Answer	Accept	Reject	Marks
5 (a)	releases thermal energy	releases heat (energy) produces an increase in temperature	just releases energy	1
(b)	 D			1
(c)	 A			1
(d)	**M1** (consists of) positive <u>AND</u> negative/oppositely charged ions/Mg^{2+} <u>AND</u> O^{2-} (ions) **IGNORE** references to loss and gain of electrons **M2** (strong) attraction between (positive <u>AND</u> negative/ oppositely charged) ions/Mg^{2+} <u>AND</u> O^{2-} (ions) **M3** many ions (present in lattice)/giant structure/giant lattice **M4** large amount of energy required (to separate the ions/overcome the attraction between the ions) If mention of covalent bonds/metallic bonds/intermolecular forces only **M4** can be awarded	 (strong) ionic bonding/(strong) ionic bonds break the ionic bonding/bonds		4
7 (e)	**M1** (name) magnesium chloride **M2** (formula) $MgCl_2$ Penalise inappropriate use of upper or lower case letters or numbers in the wrong place	 accept a correct formula as a <u>product</u> in an equation whether the equation correct or not		1 1
			Total	**9**

Question number				Answer	Notes	Marks
6	a		M1	nucleus		1
			M2	protons	Accept in either order	1
			M3	neutrons		1
			M4	electrons		1
			M5	shells		1
			M6	protons AND electrons	In either order	1
			M7	electrons		1
	b	i		3		1
		ii		5		1