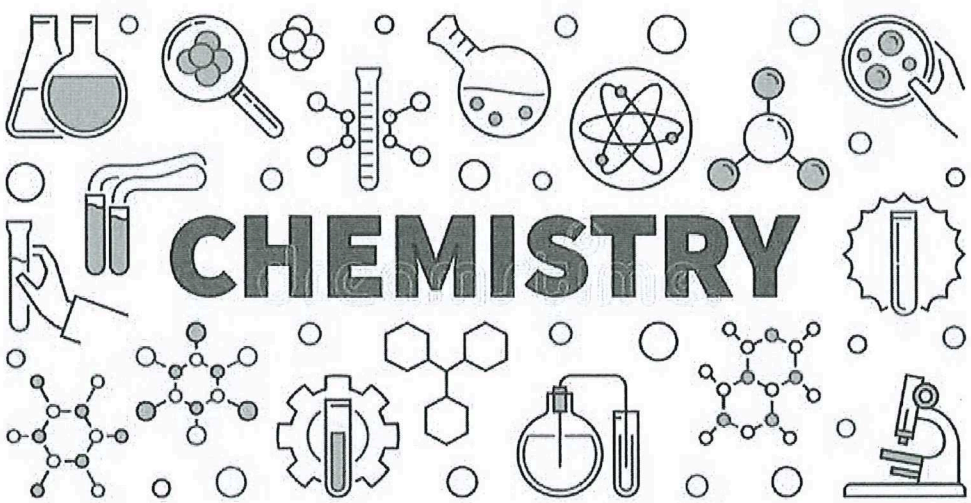
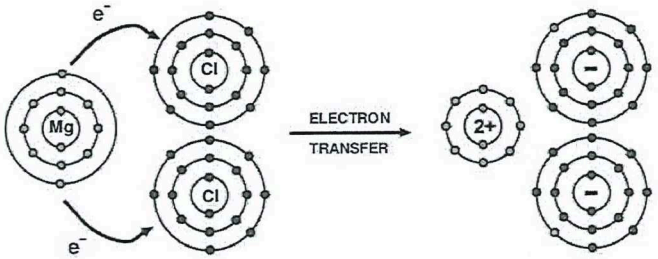


WJEC Chemistry 2

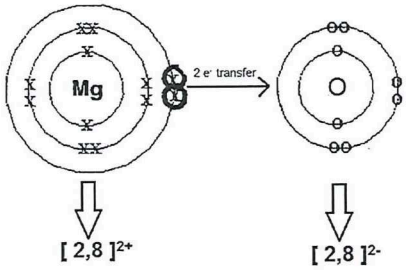
Dual Award – Higher Tier

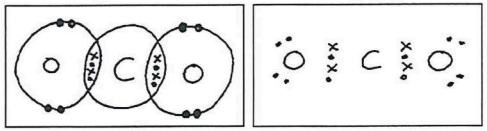
2.1 Mark Scheme

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
7				**Indicative content** Description • magnesium atom loses its 2 outer shell electrons • becomes a positive ion • both chlorine atoms gain an electron • become negative ions • attraction between the oppositely charged ions  Explanation • they transfer electrons to gain full outer shell electrons • high melting point due to strong bonds between the ions requiring lots of energy to split them • it conducts electricity when molten or in solution because only then are the charged ions are free to move and carry the electrical charge / it does not conduct when solid as ions are immobile	4	2		6		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
				5-6 marks Comprehensive description of bonding and explanation of two properties *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.* **3-4 marks** Good basic description of bonding and explanation of one property *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.* **1-2 marks** Attempt at simple description of bonding or explanation of one property *There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.* **0 marks** *No attempt made or no response worthy of credit.*						
				Question 7 total	**4**	**2**	**0**	**6**	**0**	**0**

Higher Tier only questions

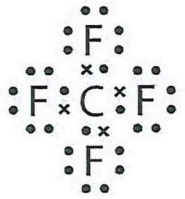
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	*(a)*			 both outer shell electrons of the magnesium shown going to the outer shell of the oxygen (1) electron configuration and charge of magnesium ion (1) electron configuration and charge of oxide ion (1) award (1) for charges of both the magnesium and oxide ions without electron configurations / both configurations of the magnesium and oxide ions without charges accept outer shell electron diagrams only	1	2		3		
	(b)			the <u>charges</u> of the ions in <u>magnesium oxide are greater</u> (than the charges of the ions in sodium chloride) (1) this results in <u>greater attraction / stronger bonds</u> needing <u>more energy</u> to break down the structure (1)	2			2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			 diagram with two shared pairs of electrons in each overlap and complete octets (2) award (1) for overlapping both oxygen outer shells with carbon outer shell with one shared pair in each overlap		2		2		
				Question 2 total	**3**	**4**	**0**	**7**	**0**	**0**

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
5	*(a)*			Its structure contains 32 faces ✓ Has a relative molecular mass of 60 ☐ Is an allotrope of carbon ✓ Has a giant ionic structure ☐ is a hydrocarbon compound ☐ It is a smart material ☐ Is 1×10^{25} time smaller than a football ✓ award (2) for all 3 correct award (1) for any 2 correct award (1) for 3 correct and 1 incorrect if four boxes ticked award (0) for 2 correct and 2 incorrect if four boxes ticked	2			2		
	(b)	(i)		90 (2) award (1) for 180 or for the total number of sides on all pentagons or all hexagons i.e. (12 × 5) / 60 / (20 × 6) / 120 no ECF if incorrect number of sides calculated in first step	1	1		2	2	
		(ii)		6.97×10^{-28} (3) award (2) for correct calculation of 0.697 / 0.69655 if incorrect answer award (1) for correct identification of radius as 0.55 if final calculation is totally incorrect award (2) for correct answers using the diameter instead of radius (5.57×10^{-27}) award (1) for answer not given in standard form (5.57) accept correct answers using π value from the calculator	1	2		3	3	

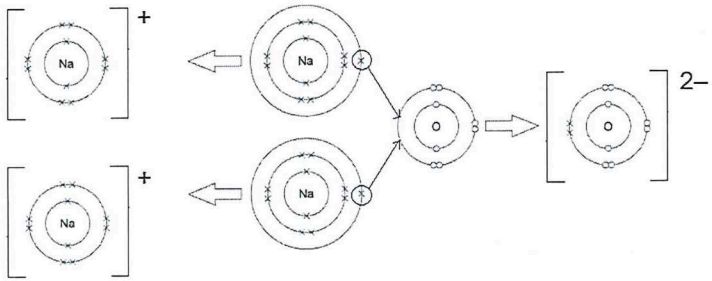
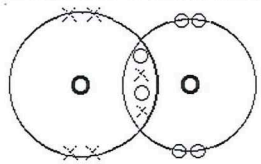
Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(c)			large surface area	1			1		
	(d)			do not know the **long term** effects (of nano-particles)	1			1		
	(e)			**good conductor** it is similar to graphite / has delocalised electrons / only bonded to three other carbon atoms (1) **not good conductor** it is (simple) molecular / exists as discrete molecules / delocalised electrons trapped within the ball structure (1) award (1) if both reasons given but not linked to good / not good conductor			2	2		
				Question 5 total	**6**	**3**	**2**	**11**	**5**	**0**

Higher Tier only questions

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)		ionic	1			1		
		(ii)		award (1) for either of following melted / made molten dissolved - accept put into water neutral answer - heated ions are free to move (1) do not accept reference to electrons being free to move	2			2		
	(b)	(i)		award (2) for correct diagram  accept any representation of electrons e.g. all crosses or all dots if incorrect award (1) for all four shared pairs		2		2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
		(ii)		(individual) molecules are not joined / weak forces of attraction between molecules (1) little energy/heat needed to break (intermolecular) forces (of attraction) (1)	2			2		
	(c)			absorbs UV rays / reflects UV rays / transparent (1) neutral answer – absorbs sunlight catalyses the breakdown of dirt / enables water to spread out (into a film) on the window / hydrophilic (1)	2			2		
				Question 3 total	**7**	**2**	**0**	**9**	**0**	**0**

HIGHER TIER ONLY QUESTIONS

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)		 outer shell electron of both sodium atoms shown going to the outer shell of the oxygen atom (1) correct charges on **both** sodium ions <u>and</u> the oxide ion (1)		2		2		
		(ii)		 award (2) for correct diagram with **two** shared pairs of electrons in the overlap <u>and</u> correct octet for both atoms if incorrect award (1) for overlapping oxygen atoms with **two** shared pairs in the overlap		2		2		

Question				Marking details	Marks available					
					AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)	I	graphite – (because it has) free/mobile/delocalised electrons (between the layers)	1			1		
			II	graphite – (because) the layers can slide over each other	1			1		
		(ii)		nanotubes / graphene / fullerene / buckminsterfullerene accept 'bucky ball'	1			1		
				Question 2 total	**3**	**4**	**0**	**7**	**0**	**0**