Mark Scheme - 5

1.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			3	$Ba(OH)_2$ (1) Fe^{3+} (1) HPO_4^{2-} (1)			
(b)			2	sodium loses an electron (1) bromine gains an electron (1)	electrons transferred (1)		

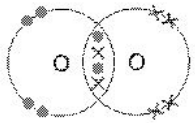
2.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			3	two discrete diagrams needed - diagram 1 showing transfer of electrons - diagram 2 showing ions diagram 1 two potassium atoms lose 1 electron each (1) one sulfur atom gains 2 electrons (1) diagram 2 two K^+ ions and one S^{2-} ion formed (1) *octet of electrons around* S^{2-} *not needed*	if transferred electrons on both potassium and sulfur award (1)		
(b)			2	two shared pairs of electrons (S—F) (1) octet of electrons around S and both F atoms (1)			

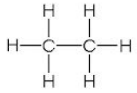
3.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		3	diagrammatic representation showing clearly two Na atoms losing 1 outer electron each (1) one O atom gaining 2 electrons (1) Na^+ and O^{2-} (both needed) (1) there must be no ambiguity e.g. electrons cannot be on atoms and ions at the same time			
	(ii)		1	sodium ion 2, 8 oxide ion 2, 8 both needed			
(b)			3	simple molecular (1) weak bonds between molecules (1) only a small amount of energy needed to break them (1)	simple covalent	covalent	

4.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			3	many strong bonds in all directions in diamond (1) lots of energy needed to separate atoms / break bonds (1) weak bonds **between molecules** therefore less energy needed to separate them (1)	hydrogen is simple molecular but diamond is giant covalent for (1) if no other credit awarded		
(b)			2	thermal/electrical conductivity (1) free moving / delocalised electrons between layers (1) or slippery / soft (1) layers able to move over each other / weak bonds / forces between layers (1) must have property for explanation mark to be awarded			brittle
(c)			2	two shared pairs of electrons (1) outer shells of both atoms complete (1)  must have double bond to be awarded second mark			

5.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	B			
	(ii)		1	water		H_2O hydrogen oxide	hydroxide
(b)	(i)		1	8			
	(ii)		1	4			
	(iii)		1	C_2H_6	CH_3CH_3		

6.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	graphite ——— giant covalent potassium ——— metallic sodium chloride ——— giant ionic three correct answers (2) one correct answer (1)			
(b)			1	graphite		giant covalent	
(c)			1	carbon dioxide, water, etc	CO_2, H_2O, etc		

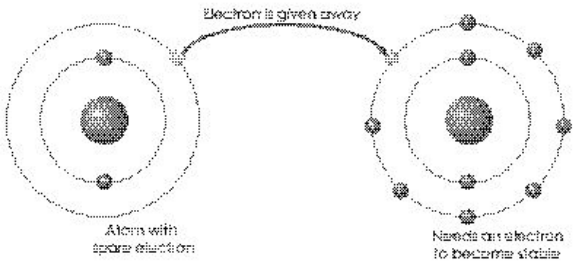
7.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	graphite and nanotube (1) both have **free moving** / **delocalised** electrons (1)	mark independently		
(b)			2	graphite (1) weak bonds **between** layers / **layers** able to slide over each other (1) [marks linked i.e. second mark cannot be awarded if first is not given]			

8.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	C			
(b)			1	any named metal e.g. sodium, magnesium	symbol e.g. Na, Mg		
(c)			1	A / D	graphite / metal named in part *(b)*	carbon	
(d)			1	B			

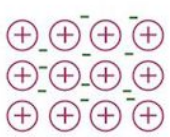
9.

Mark	Answer
6	**Indicative content:** diagram showing bonding in lithium chloride with no ambiguity  to form Li^+ and Cl^- (outer electrons only need be shown) description of bonding in words i.e. lithium atom loses an electron to become a positive ion, chlorine atom gains an electron to become a negative chloride ion, strong force of attraction between oppositely charged ions; high melting point due to strong bonds between the ions; conducts electricity when molten or in solution as charged ions are free to move; does not conduct when solid as ions are immobile **5-6 marks:** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks:** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks:** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks:** The candidate does not make any attempt or give a relevant answer worthy of credit.

10.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	(silicon difficult to classify) because it has metallic and non-metallic properties (1) response clearly indicating one or more metallic property and contrasting non-metallic property, e.g. it has a high melting point/boiling point like a metal but is brittle like a non-metal (2)	semi-metal / metalloid		it is a metal and a non-metal
(b)			1	Mg (ignore atomic number / mass number)		magnesium	
(c)	(i)		1	2			
	(ii)		1	Ag_2O	$Ag^{+}{}_2O^{2-}$		
(d)	(i)		1	antibacterial / antiviral / antifungal	kills germs / kills bacteria / antiseptic	disinfectant reduces smells	
	(ii)		1	silver nanoparticles can get into drinking water / water supplies / lakes / rivers could be dangerous to health / harmful / toxic don't know the effect / long term effect not known *uncertainty* must *be implied*		reference to the air / atmosphere / rain pollutes water / the environment	

11.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	2,8,1			
(b)			2	 positive ions fixed positions electrons mobile / sea – all four points (2) – two/three points (1)			
(c)	(i)		1	floats moves fizzes / bubbles goes into a round shape / melts – any two		vigorous reaction dissolves	
	(ii)		1	sodium hydroxide and hydrogen – both needed	$NaOH + H_2$	H	
(d)			1	potassium burns / lilac flame		potassium moves faster	yellow / orange / red / green flame
(e)			2	atoms get bigger / greater distance between the (positive) nucleus and the (outer) electron (1) outer electron more weakly held (1)			

12.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	C	98 and 890		
(b)			1	to prevent sodium reacting with air/oxygen/water (vapour)	prevent from oxidising / corroding	because it reacts with air/oxygen/water (vapour)	
(c)	(i)		1	yellow yellow/orange	orange		
	(ii)		2	sodium + oxygen (1) sodium oxide (1)	$Na + O_2$ (1) Na_2O (1) – ignore balancing		
	(iii)		1	$2Na + Cl_2 \rightarrow 2NaCl$			

13.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
			3	nanosilver has antibacterial / antiviral / antifungal properties / kills germs (1) could be absorbed through skin / breathed in (1) long term effects **unknown** (1)	toxic could be released into environment		**can** cause ...