

CARBON ALLOTROPES & GIANT COVALENT STRUCTURES 1

MARK SCHEME

Q1.

Question	Answer	Extra information	Marks
	high melting point	reference to incorrect bonding or incorrect particles or incorrect structure = max 3	
		accept will not melt (at high temperatures)	1
		ignore withstand high temperatures	
	because a lot of energy needed to break bonds		1
	because it is covalent or has strong bonds	accept bonds are hard to break	1
	and because it is a giant structure or a macromolecule or a lattice	ignore many bonds	1
Total marks			4

Q2.

Question	Answer	Extra information	Marks
(a)	Graphite:	it = graphite	
	because the layers (of carbon atoms) in graphite can move / slide		1
	this is because there are only weak intermolecular forces or weak forces between layers	accept Van der Waals' forces allow no covalent bonds between layers	1
	Diamond:		
	however, in diamond, each carbon atom is (strongly /	allow diamond has three dimensional / tetrahedral structure	1

	covalently) bonded to 4 others		
	so no carbon / atoms able to move / slide	allow so no layers to slide or so diamond is rigid	1
(b)	because graphite has delocalized electrons / sea of electrons which can carry charge / current or move through the structure however, diamond has no delocalised electrons	allow free / mobile / roaming electrons accept however, diamond has all (outer) electrons used in bonding	1 1 1
Total marks			7

Q3.

Question	Answer	Extra information	Marks
	giant structure or lattice or macromolecule	max 3 marks if incorrect bonding	1
	strong bonds (between carbon / atoms)		1
	covalent (bonds)		1
	each carbon / atom forms 4 bonds	accept tetrahedral if no other marks awarded, allow carbon (atoms) for 1 mark	1
Total marks			4

Q4.

Question	Answer	Extra information	Marks
	any two from: <ul style="list-style-type: none"> • bonds are strong • a lot of energy needed to break bonds • all atoms are joined by (covalent) bonds • a large number of bonds would need to be broken 	accept hard to break allow heat for energy accept forms lattice	2

		reference to ionic / metallic = 1 mark intermolecular forces /forces between molecules = max 1 mark ignore electrostatic many strong bonds need to be broken = 2 marks accept 'double bonds' as equivalent to bonds	
Total marks			2

Q5.

Question	Answer	Extra information	Marks
(a)(i)	covalent	two different answers indicated gains 0 marks	1
(ii)	carbon	two different answers indicated gains 0 marks	1
(iii)	3	two different answers indicated gains 0 marks	1
(b)	layers can slide / slip because there are no bonds between layers or so (pieces of) graphite rubs / breaks off or graphite left on the paper	accept because weak forces / bonds between layers	1 1
Total marks			5

Q6.

Question	Answer	Extra information	Marks
(a)	reduce wear of metal i.e. don't get damaged or stop / reduce friction	or other sensible answer accept stop metal heating up accept move more smoothly ignore make it slippery / rub more smoothly	1

	or prevent seizing	accept can move freely	
(b)(i)	carbon		1
(ii)	layers (of atoms) can slide / slip over each other or weak forces of attraction / weak bonds (between layers)	allow slip off allow no bonds accept there are weak forces of attraction for 1 mark even when there is no reference to layers accept atoms slide over each other (for 1 mark) an answer which only states there are weak bonds would gain 0 marks when there is no reference to layers weak covalent bonds = 0 marks	1 1
Total marks			4

Q7.

Question	Answer	Extra information	Marks
	high melting point not flammable		1 1
Total marks			2

Q8.

Question	Answer	Extra information	Marks
	high giant four covalent	allow covalent	1 1 1 1
Total marks			4

Q9.

Question	Answer	Extra information	Marks
	any two from: <ul style="list-style-type: none">• conducts electricity• soft• slippery• high melting point	ignore hardwearing / does not stick apply list principle	2
Total marks			2