

METALS & NON-METALS 2

MARK SCHEME

Q1.

Question	Answer	Extra information	Marks
(i)	an alloy		1
(ii)	harder		1
Total marks			2

Q2.

Question	Answer	Extra information	Marks
(a)	Structure mark: either Al (atoms) in layers / rows or alloy (atoms) not in layers / rows Sliding mark: either so (Al layers) can slide or so (alloy) layers cannot slide	accept Al (atoms) all the same size allow Al (atoms) in lines accept different sizes of atoms in alloy allow alloy (atoms) not in lines	1 1
(b)	there are delocalised electrons / free electrons / electrons which move within the aluminium / metallic structure therefore, these electrons are able to carry the current / charge	if the candidates use the terms covalent / ionic / molecules / intermolecular incorrectly in the answer this will limit the mark to a maximum of 1	1 1
Total marks			4

Q3.

Question	Answer	Extra information	Marks
	in pure copper the atoms are arranged in layers	accept a correct diagram	1
	therefore, copper is soft because copper atoms can slide over each other	accept a correct diagram	1
	in bronze the tin atoms disrupt / distort the structure		1
	therefore, bronze is harder than copper because the metal atoms cannot slide over each other		1
Total marks			4

Q4.

Question	Answer	Extra information	Marks
	lattice / regular pattern / layers / giant structure / close-packed arrangement	reference to incorrect particles or incorrect bonding or incorrect structure = max 2	1
	(of) positive ions or (of) atoms		1
	(with) delocalised / free electrons		1
Total marks			3

Q5.

Question	Answer	Extra information	Marks
(i)	can return to its original shape	accept shape memory alloy accept smart alloy ignore other properties	1
(ii)	(pure copper is too) soft	accept converse accept malleable or bends accept copper is running out ignore references to strength and weakness	1
Total marks			2

Q6.

Question	Answer	Extra information	Marks
(a)	(Chromium =) 20 (Nickel =) 8	in correct order accept Chromium = 8 and Nickel = 20 for 1 mark	1 1
(b)(i)	(because iron is made up of only) one type of atom		1
(ii)	not strong	ignore soft / corrosive / flexible accept it rusts / corrodes or that it could wear away accept could change shape / bend accept layers / atoms could slide (over each other)	1
(iii)	has different sized atoms / particles or structure is different/distorted / disrupted so it is difficult for layers / atoms / particles to slip / slide (over each other)	accept not in layers or not regular accept layers cannot slip / slide	1 1
Total marks			6

Q7.

Question	Answer	Extra information	Marks
(a)(i)	contains enough metal to make it economical to extract		1
(ii)	Fe (+) CO ₂ (Fe ₂ O ₃) (+)3.....(CO) →2.....(Fe) (+)3...(CO ₂)	formula of both products must be correct balancing correct allow correct balancing using Fe ₂	1 1
(iii)	reduction	accept redox	1
(b)(i)	oxygen reacts with the carbon to produce carbon dioxide OR carbon dioxide is produced (1) which escapes as a gas (1)	allow carbon monoxide for carbon dioxide	1 1
(ii)	to give steels with different /	ignore to make different alloys	1

	particular properties or for different / particular uses		
(iii)	copper is very expensive	accept the metal (iron / steel) costs less than copper ignore energy	1
	because copper ores are 'low grade' / running out	allow copper is rare ignore nickel	1
Total marks			9

Q8.

Question	Answer	Extra information	Marks
(a)(i)	(thermal) decomposition	accept endothermic (reaction) do not accept combustion / burning	1
	by heating	accept in a furnace / kiln	1
(ii)	carbon is more reactive than lead / zinc (so) lead / zinc oxide is reduced or oxygen is removed (by carbon)	they = zinc or lead accept so lead / zinc oxide reacts with carbon / carbon monoxide accept carbon displaces zinc / lead (from their oxide) allow carbon reacts with the oxygen accept word equation or balanced symbol equation	1 1
(iii)	(zinc separates / escapes because) zinc boils / turns to a gas (at the temperature of the furnace) or the boiling point of zinc is below the temperature of the furnace lead separates because it melts but does not boil or the temperature of the furnace is above the melting point of lead but below its boiling point	ignore density ignore evaporates ignore density accept lead is molten for lead melts if no other mark awarded	1 1

		allow 1 mark for they (zinc and lead) have different boiling points or zinc's boiling point is lower than lead's or vice versa	
Total marks			6

Q9.

Question	Answer	Extra information	Marks
	any two from: <ul style="list-style-type: none"> • heat (copper oxide with carbon) • oxygen is removed by carbon or carbon monoxide / carbon dioxide is produced or carbon displaces copper • because carbon is more reactive than copper 	accept copper (oxide) loses oxygen or carbon gains oxygen accept carbon oxide accept a correct word or balanced symbol equation allow a correct comparison of reactivity	2
Total marks			2