Mark Scheme - 1.6 Limestone

1.

Mark	Answer
6 QWC	**Indicative content** • heat required to turn limestone into quicklime; water added to turn quicklime into slaked lime • limestone glows and becomes crumbly when heated; sizzling/ steam being released when water is added • thermal decomposition causes calcium carbonate to decompose forming carbon dioxide gas and calcium oxide; water reacts with calcium oxide to form calcium hydroxide • $CaCO_3 \rightarrow CaO + CO_2$; $CaO + H_2O \rightarrow Ca(OH)_2$ **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.

2.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		3	reactants: $CaO + H_2O$ (1) product: $Ca(OH)_2$ (1) balancing: 1 : 1 : 1 (1) – reactants and product must be correct before balancing mark awarded			
	(ii)	I	1	2			
		II	1	1			
	(iii)		1	(bubble in) carbon dioxide (limewater) turns milky – both needed			
(b)			2	*Opinion and response must match to be awarded marks* Yes and advantages given e.g. building material, (local) jobs, used in blast furnace / used to extract iron, used to make cement / used to make mortar / used to make concrete, used to make glass, used to neutralise acid soil / manufacture of medicinal antacids, aggregate for roads, abrasive in toothpastes – any two for (1) each No and disadvantages given e.g. dust, noise / blasting, (heavy) lorries / traffic, landscape destruction, habitat destruction / wildlife destruction – any two for (1) each NB – Accept the counter argument i.e. 'even though' / 'but' statements e.g. No – provides jobs but only in the local areas not country wide Yes – landscape destroyed but can be reclaimed			

3.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	32 + 35 + 12 + 12 + 6 = 97 (1) 100-97 = 3 (1) – correct answer only (cao) (2) – follow through error (ft)			
(b)			2	dust noise / blasting (heavy) lorries / traffic destroys landscape / ruins landscape / unsightly destroys habitats / ruins habitats / destroys wildlife – any two for (1) each		pollution	
(c)	(i)		1	calcium oxide + water → calcium hydroxide			reference to quicklime and/or slaked lime
	(ii)		2	steam / water boils quicklime crumbles / expands / 'puffs up' / breaks up hisses – any two for (1) each	fizzes	explodes heat released	

4.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			3	limestone / chalk / marble (1) CaO (1) calcium hydroxide (1)			
(b)	(i)		1	brick-red	red		
	(ii)		2	carbon dioxide / CO_2 (1) must have correct gas to award test mark turns limewater milky (1)			
	(iii)		2	1.9/2.0 (1) 95 (1) award (2) for correct answer only (cao)			
(c)			2	landscaping during /after quarry to remove visual pollution restrict quarry size to reduce visual pollution trains instead of lorries blast at agreed times spray lorry wheels with water to reduce dust remove endangered species to safe site any two for (1) each	other sensible	reference to economic benefits	
(d)			2	local jobs money into local economy limestone for building / named buildings e.g. houses, walls, etc. local industries / named industry e.g. for making cement/iron building better local road system any two for (1) each	other sensible		

5.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	iron ore ——— source of iron limestone ⤫ acts as a fuel coke ⤫ removes impurities All **three** correct (2) Any **one** correct (1)			
(b)			1	carbon + oxygen → carbon dioxide			air coke
(c)			2	**A** (1) oxygen removed / oxygen loss (1)	iron oxide is reduced oxygen lost by iron oxide gains **both** marks	reference to 'oxide'	oxygen lost by **iron**
(d)			1	mixture			

6.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	gives heat / energy to the mixture	burns very hot	ignites / flammable	
(b)	(i)		1	aluminium oxide + iron	Al_2O_3 + Fe – ignore balancing		
	(ii)		1	iron oxide is reduced since oxygen is removed / lost			
(c)	(i)		1	$TiCl_4 + 4Na \longrightarrow Ti + 4NaCl$			
	(ii)		1	titanium is less reactive than sodium		titanium is unreactive / not very reactive	
	(iii)		1	prevent the sodium reacting with air or oxygen / stops the sodium burning / argon not reactive / inert			
	(iv)		1	sodium is very expensive / lots of heat or energy needed	needs high temperature to work		

7.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	battery acid			
	(ii)		1	blood			
	(iii)		1	**pure** water			
(b)			3	**A** copper carbonate (1) **B** copper oxide (1) **C** sodium hydroxide (1)	$CuCO_3$ CuO NaOH		

8.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	lemon juice			
	(ii)		1	saliva			
(b)	(i)		2	magnesium chloride (1) water (1)	formulae		
	(ii)		2	carbon dioxide (1) gas must be correct to award test mark turns limewater milky (1)			