

GCSE CHEMISTRY

Topic Paper: 9 Pollution, carbon dioxide and methane as greenhouse gases (Chemistry of the atmosphere) Part 1 & 2 Mark Scheme

MARK SCHEME



50 Marks

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		(ii)	any two from:			
			allow converse arguments			
			low / <u>less energy</u> / heat or lower temperature needed ignore <u>no</u> <u>energy</u> without explanation			
			low / <u>less fuel</u> burned ignore <u>no fuel</u> without explanation accept <u>less fuel</u> for extraction / transportation of raw materials			
			no / less carbon dioxide / global warming / less use of carbonate(s) accept name(s) of this carbonate(s)			
			less landfill ignore less litter			
			less use of resources / raw materials		2	
						[8]
M2.		(a)	calcium oxide	1		
		cal	cium hydroxide	1		
		cal	cium carbonate			
			substances must be in the order shown	1		
	(b)	(i)	strength of mortar decreases (as volume of sand increases)	1		
		(ii)	400 (cm ³)	1		
			because the height the metal ball dropped from should be 42 cm and not 37 cm			
			accept because the other results show that the height the metal ball dropped from should have an interval of 6cm	1		
	(c)	cor	ntains aggregate			
	. ,		allow bonding is stronger	1		[7]

M3. (a) (i) 3 / three

(ii) 5 / five

2

1

1

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(b)) any	y one from:	
		less / no transport accept less / no distance	
		less / no (fossil) fuel used ignore references to carbon dioxide / carbon emissions	1
(c)) (i)	carbon dioxide / CO_2	
		for a correct emission	1
		(causes) global warming / climate change / greenhouse gas explanation must be correct for named emission ignore ozone layer	
		or	
		(cement) particles / smoke (1)	
		(causes) asthma / dust / (global) dimming (1) accept breathing problems	
		or	
		sulfur dioxide / SO_{2}^{2} / nitrogen oxides / NO_{x}^{2} (1)	
		(causes) acid rain (1) do not accept nitrogen or water vapour for emissions do not accept no named emission	1
	(ii)	absorb / trap / capture / filter / pass through water / scrub / electrostatic attraction	on
	()	ignore condense / off setting / different fuel	1 [6]
M4.	(a)	calcium carbonate <i>not</i> formula	1

(b) calcium carbonate → calcium oxide
 not common names
 allow correct formulae + carbon dioxide
 (c) calcium hydroxide

1

1

1

not formula

(d)	$CaO + H_2O \rightarrow Ca(OH)_2$		
	allow if doubled all formulae correct, no extra ones		
		1	
	balanced	1	
(e)	filtration allow centrifugation		
	<i>not</i> decanting <i>not</i> evaporation, crystallisation	1	
(f)	electrolysis stated or implied	1	
	molten MgO / magnesium oxide is ionic / Mg^{2+} goes to cathode		
	<i>not</i> just heated	1	
	or add sodium / K / Ca / Li / a more reactive metal	1	
	displaces Mg / reduces Mg give no marks if reference made to reduction by C or H		
	give no marks in reference made to reduction by C of m	1	[9]
((a) limewater or calcium hydroxide solution	1	
		1	

(reacts with carbon dioxide and) turns cloudy / milky linked to first point if no other mark awarded 'puts out lighted splint' gains **1** mark

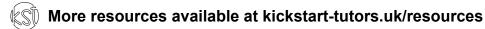
(b) (i) any **two** from:

M5.

same volume / amount of the acids concentration of the acids temperature same surface area / size / mass / amount of calcium carbonate same measuring equipment

2

1



(ii) any **three** from:

M6.

M7.

		.,				
			(after about 4 minutes) the sulfuric acid stops reacting or nitric acid cor to react	ntinue	s	
			accept more CO ₂ with nitric acid at any time after 4 minutes			
			(initially) the reaction with sulfuric acid is faster			
			(the reaction stops) because calcium sulfate is a solid allow sulfuric acid produces a solid			
			(the reaction continues) because calcium nitrate is soluble / in solution aqueous	/		
			allow nitric acid produces an (aqueous) solution			
			because the calcium sulfate prevents the sulfuric acid reacting with the calcium carbonate	8		
			(the rate is faster) because sulfuric acid contains two hydrogens	3		
						[7]
		(i) (hot	air) gives faster reaction makes coal burn faster			
•		(provides	s air / oxygen to help to) allow the coal to burn / helps combustion but the waste / gases / carbon dioxide			
			any one for 1 mark	1		
	(ii)		osition of limestone yields carbon dioxide (owtte) oustion / burning of coal produces carbon dioxide (owtte)			
			each for 1 mark	2		[3]
•		(a) (i)	H ₂ O			
			must be formula		1	
		Ca	O must be formula			
			multiple formula		1	
		(ii) car	bon dioxide from the air / (Earth's early) atmosphere <i>it = carbon (dioxide)</i>			
			accept carbon dioxide from millions of years ago		1	
		for	med (sedimentary) rocks or fossil fuels			
			ignore trapped / stored		1	



(b) (i) decreases rapidly at first *it = carbon (dioxide)*

> then slowly **or** levels off allow both marks if the description is correct using either 'rapidly' **or** 'slowly' allow correct use of figures for either marking point if no other mark awarded, allow CO₂ decreased for **1** mark

(ii) any **two** from:

it = carbon (dioxide) accept photosynthesis used by plants dissolved in oceans 'locked up' in fossil fuels **or** formed fossil fuels 'locked up' in rocks **or** formed rocks

(c) (yes)

it = percentage of carbon (dioxide) ignore yes or no

because the percentage of carbon dioxide is increasing

which causes global warming (to increase) allow (carbon dioxide) causes greenhouse effect/climate change

or

(no)

because the percentage of carbon dioxide is low (1)

compared to millions of years ago (1) allow global warming can be caused by other factors (e.g. Sun / water vapour / methane)

[10]

1

1

2

1

1