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GCSE

Chemistry

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MEG

MIDLAND EXAMINING GROUP

GCSE EXAMINATIONS SUMMER 1994

MARKING SCHEME

for

CHEMISTRY (1375/2)

PAPER 2

Notes:

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QUESTION	KEY POINTS	MARKS
1(a)	Oxygen or O_2 (NOT O)	1
(b)	Sulphuric or sulphurous or hydrogen sulphide	1
(c)	Silver, gold, platinum, copper (not aluminium or lead)	1
(d)	Blue/purple or equivalent	1
(e)	Calcium or argon	1
(f)	Any named group 1 element or Cu or Ag (NAME or symbol) (Charge not required)	1
	TOTAL	6
2(a)(i)	4	1
(ii)	3	1
(iii)	The pupil should test more known colours in the experiment OR Use many solutions until it worked. OR Compare with other colours. NOT reference to different solvents or different lipsticks or leave longer NOT "more experiments" unless explained	1
(b)(i)	To help increase the rate at which the colour dissolves: OR Correct reference to increased surface area OR more easily dissolved. OR To break the cells to release the colour. Reference to fast "reaction" acceptable (but see 'ii')	1
(ii)	Ethanol dissolves the colouring, water does not (either idea) OR Ethanol dissolves colour better OR extracts colour easier (If reference is made such as "ethanol reacts better than (water" and this is also referred to in (b)(i), award 1 mark only (for double reference	1
(iii)	By filtration decanting sieving	1
	TOTAL	6
		12

3(a)	HCl and NaOH (B)	Letters only B A D C	1
(b)	Sugar being dissolved (A)	No others No multiple answers	1
(c)	Ammonia being bubbled into water (D)		1
(d)	Excess alkali being added to a weak acid (C)		1
		TOTAL	4

4(a)(i) Evaporation/vaporisation NOT transpiration 1

(ii) Cooling/condensation/precipitation 1

(iii)
Liquid to solid or freezing(1) i.e. process/change of state
(Cooling/explaining cooling(1) i.e. cause of process
((temperature idea)
(i.e. temperature lower BUT NOT clouds rising unless
(cooling implied
(KEY WORD - a temperature type word 2

(b)(i) The water is hard OR pipes and boilers could be furred OR no lather when washing OR More soap used OR Scale formed.
OR Scum formed 1
(Any one idea)

(ii) Add chlorine/chlorination/O_3
Allow boiling or sterilising tablets 1

TOTAL 6

10

5(a)(i) The bromine is decolourised. OR The colour disappears.
(Final colour to be marked)
Do NOT accept "goes clear" or "the colour changes" 1

(ii) Plastic bags, pipes, food containers. Any reasonable use which you know is correct (including "packaging") 1
(NOT making plastics)

(b)(i) Cracking 1

(ii) To speed up the reaction OR change/alter the rate
(NOT efficiency)
OR allows reaction at a lower temperature 1

(iii) C_2H_4 + HOH ----> C_2H_5OH (accept C_2H_6O) 1

(c)(i) Plotting the graph. Plotting points - 2 marks (spot on)
(-1 for each error)
Reasonably smooth curve - 1 mark (NOT "join the dots")
(Visible points not needed)
Curve consequential (Bar Chart Max 1 mark) 3

(ii) 210 - 225°C (1) working on graph
(by arrow or lines drawn etc)(1) 2
These two marks are consequential to their graph

(iii) The more carbons the higher the b.pt.,stated or implied 1
Right idea, award the mark (even if actual statement wrong)

(iv) There are more industries
More money to "mine" or buy it
OR
Better technology available
Britain colder, more fuel needed
OR
More natural gas sources tapped
More readily available 1

KEY areas here are:
Supply or more available
Economic considerations (more affordable)
The need i.e. climate considerations
Technology/industry slant
(NOT a pollution answer
NOT Africa has none i.e. gross overstatement)
Any ONE answer

TOTAL 12

12

6(a)(i) 5 1

(ii) 4 1

All 4 marked strictly as per mark scheme

(iii) 3 1

(iv) X^{3+}, B^{3+} 1

(b)(i) $3Mg + X_2O_3 \longrightarrow 3MgO + 2X$ (NOT X_2) (Fully balanced) 1
Allow multiples

(ii) 1 mark for fact i.e. Mg oxidised and X reduced (both stated)
(1 mark for explanation of either
(Mg gains oxygen/reference to Mg as a
(reducing or X_2O_3 as an oxidising agent
(OR X_2O_3 loses oxygen 2

(iii) Heat is given out
OR Temperature rises
OR Energy released/lost 1

TOTAL 8

7(a)(i) hydrogen 1
accept H_2

(ii) ammonium nitrate (NOT ammonia nitrate)
accept correct formula 1

(b)(i) reaction rate increased (Rate idea needed) 1

(ii) reaction rate decreased/reaction slower/accept reaction "slow" 1

4

(c) (i) Any one easy mark
THEN see below
to improve crop quality
to increase crop yield
to grow more food
to grow faster
to increase profit
to replenish nutrients
food tastes better 2

One reason regarding soil (1)) Different
One reason regarding economics (1)) answers
BUT) required
Two reasons regarding crops is OK) for 2 marks
NOT Add NPK unless qualified/explained
NOR adding minerals
NOT crumb structure idea
NOR makes food look better

(ii) Pollution qualified/ pH reference (NOT poisonous idea) 1
Allow just "water pollution" NOT cost idea

(iii) Keeps fertiliser dry/ waterproof/stronger/
NOT re-usable/longer lasting NOT cost reason 1

(iv) (pollution qualified/
(difficult to destroy/burns to give toxic fumes
(non-biodegradable/ do not rot 1

TOTAL 5 (on page 10)

8(a)(i) Magnesium oxide/ MgO (1 for each) 2

(ii) Greater/increased reaction/burning/surface area 1
NOT blown around

(iii) (Fireworks. flares, alloys, flash bulbs
(Bolting to ships/oil pipelines/corrosion protection 1
(MUST be for Mg element)

(b)(i) Calcium, magnesium, iron, copper (ALL correct) 1

(ii) Lighted splint (1) squeaky pop (1)) mark independently
OR Burning (1) water formed & test (1)) on the two points 2
Test (1) Result (1)

(iii) Word equation (1) symbol equation (1)) calcium oxide
(1) for balance) scores max 1 3
Word equation (1)
calcium + water ---> calcium hydroxide + water
Formulae correct (1)
$Ca + H_2O \longrightarrow Ca(OH)_2 + H_2$
Balancing (1)
$Ca + 2H_2O \longrightarrow Ca(OH)_2 + H_2$
(A "calcium oxide" answer scores MAXIMUM 1 mark overall)
The balancing mark is only awarded if $Ca(OH)_2$ and H_2 are correct formulae

(iv) Heat/hot steam increases reaction rate/greater molecular movement/more energy/
more collisions (i.e. reference to higher temperature or collisions or more movement etc) 1

(v) (Hot water tanks / pipes/roofing/
(coinage/copper kettles/
NOT electric cables or plating or wires 1

TOTAL 12

9(a)(i)	Filtration	1
(ii)	Solid/insoluble/the metal (allow steel or sediments) NOT impurities/residues	1
(iii)	Does not react with the effluent. i.e. plastic does not react/steel does react. Rusting and corrosion answers are OK. (NOT cost argument) If "it" is used, assume that the reference is to plastic.	1
(b)(i)	Bubbling/gas evolved/efferevescence (1) Observation CO_2 produced OR because it is acidic (1) Reason OR Limestone dissolves (1) Observation because it is a base (1) Reason i.e. Observation - one mark Reason - one mark NB "CO_2 evolved" can score either as observation or reason	2
(ii)	Use indicator paper (named or otherwise) OR Measure pH OR no more limestone dissolved (no result expected)	1
(c)	Iron is more reactive than nickel (1) displacing it (1) Result (1) reason (1)	2
(d)(i)	D	1
(ii)	A	1
(iii)	For comparison/control NOT fair test	1
	TOTAL	11

10(a)	X=Iron ore, iron oxide, haematite (ignore oxidation state) Y = slag, calcium silicate (NO marks for formulae)	2
(b)(i)	Reaction D or equation	1
(ii)	Reaction E or equation playing the field - no marks! DEAD or DEAE	1
(iii)	Reaction A or equation	1
(iv)	Reaction D/E or equation	1
(c)(i)	Two advantages selected from categories below Cost justified e.g. cheaper than extraction/saves fuel Pollution justified e.g. melting v extraction process or less landfill sites needed Resources prolonged e.g. less use of raw materials (TWO distinct reasons from three categories)	2
(ii)	Two objects (ANY sensible ones) Cars, bikes, cans - 2 easy marks (NOT coke cans)	2
	TOTAL	10

21

11(a)(i) Hydroelectric 1

(ii) methane or other correctly named fuel (e.g. alkane/ethanol)
NOT natural gas or oil 1

(iii) The production is cheaper i.e. cost argument
OR Al production needs large amounts of electrical energy (or electricity).
NOT pollution answers 1

(b)(i) $S + O_2 \text{ ----> } SO_2$ 1

(ii) Dissolves or reacts in water
(Dissolves/reacts with water/rain - KEY PHRASE) 1

(iii)
Harms plants, trees, forests(1)
buildings (erosion idea) (1)
Acidifies lakes, ponds, streams (1)
metals (corrosion idea) (1)
NOT general polluting of air 2
ANY TWO different ideas (from the four categories)

(c)(i) 44 1

(ii) $C + O_2 \text{ ----> } CO_2$

12 produce 44 tonnes) Working (1) 1
) Answer demonstrated (1)
3 produce 11 tonnes) (e.g. divide by 4 idea) 1

Mark part (ii) consequential to wrong M_r in part (i)

TOTAL 10

10

Total	94
SPG	5
Grand total	99

THE ASSESSMENT OF SPELLING, PUNCTUATION AND GRAMMAR

1994

1 The assessment of spelling, punctuation and grammar is required in the following components of this syllabus:

Component Number	Title
2	Paper 2
3	Paper 3
4	Coursework

2 The marks for each component will be awarded on the basis of the performance in spelling, punctuation and grammar on the component overall, in accordance with the performance criteria given in paragraph 4 below.

3 For the internally assessed component, teachers should first assess each candidate's work against the subject specific criteria given in the syllabus on pages 11—13 and award a total mark.

The criteria for spelling, punctuation and grammar should then be applied, and marks added to the total according to the range given below. The Coursework Assessment Forms to be issued by MEG will accommodate the marks awarded for spelling, punctuation and grammar.

4 **Application of Criteria**	**Allocation of Marks** Internally Assessed Components Component 4
Threshold performance Candidates spell, punctuate and use the rules of grammar with reasonable accuracy; they use a limited range of specialist terms appropriately.	1
Intermediate performance Candidates spell, punctuate and use the rules of grammar with considerable accuracy; they use a good range of specialist terms with facility.	2—3
High performance Candidates spell, punctuate and use the rules of grammar with almost faultless accuracy, deploying a range of grammatical constructions; they use a wide range of specialist terms adeptly and with precision.	4—5

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Mark and Answer Scheme

A1	(a)(X)	(i)	Zinc carbonate <u>ONLY</u>	*	1
		(ii)	Allow (consequential) formula of any white, insoluble, carbonate	*	1
			i.e. $Li_2CO_3/MgCO_3/CaCO_3/SrCO_3/BaCO_3/PbCO_3/Ag_2CO_3$		
	(b)(Y)	(i)	Ammonium sulphate	*	1
		(ii)	Fertiliser (only if NH_4^+ salt in (i)	*	1
		(iii)	$NH_4^+ + OH^- \rightarrow NH_3 + H_2O$ /NH_4OH (or if molecular : 1 for formula, then 1 for balance) Accept equation for any ammonium salt	**	2
	(c)(Z)	(i)	$Cu(NO_3)_2$ NB formula	*	1
		(ii)	$Fe + Cu^{2+} \rightarrow Cu + Fe^{2+}$ only	*	1
	(d)		soluble carbonate	*	1
			For <u>ANY</u> insoluble carbonate: (coloured is OK) appropriate soluble metal compound (refer back to a(i))	*	1
			mark first two independently in aqueous/solution/water conditional on a correct reagent (For Group II) metal allow hydroxide/CO_2/aqueous) or Group I)	*	1
				Total	11

A2	(a)	ethanol		*	1
		hydrogen		*	1
	(b)	calcium carbonate		*	1
		sodium chloride		*	1
	(c)	ethanol		*	1
		lead nitrate		*	1
	(d)	sodium chloride		*	1
		iron		*	1
	(e)	calcium carbonate		*	1
		lead nitrate		*	1
		If formula given accept but must be correct			
				Total	10

A3	(a)	(i)	46 (ignore g)	*	1
		(ii)	100 (ignore units)	*	1
		(iii)	100g in 250		
			400g in 1000 cm^3 i.e. (a)(ii) x 4	*	1
			400/46 i.e. divide by 46	*	1
			8.69 ---> 8.70	*	1
			(or consequential on correct use of (a)(ii) answer)		
			Just correct answer scores 3		
			Ignore significant figures		
	(b)	(i)	Calcium carbonate NAME	*	1
		(ii)	$(HCOO)_2Ca$ or CO_2 + H_2O or H_2CO_3	*	1
			Balanced	*	1
			($MgCO_3$ scores throughout (b))		
			(or balanced ionic equation scores two)		
		(iii)	Wash anything relevant/)		
			stopper the bottle)		
			because toxic/poisonous/)		
			corrosive/burns)	*	1
				Total	9

A4	(a)	Cheap	*	1
		rusts/does not bend easily/hard more reactive than Cu	*	1
	(b)	W/Pb dense (not heavy) or Pb dense	*	1
		unreactive or cheap (Pb only)	*	1
	(c)	high m pt <u>or</u> low reactivity <u>or</u> glows better <u>or</u> high resistance (anywhere in (c)) (reversed statements acceptable	*	1
	(d)	K: reactive <u>or</u> difficult to extract <u>or</u> compound stable <u>or</u> requires electricity	*	
		Pb: unreactive <u>or</u> easy to extract <u>or</u> compounds unstable	*	
		W: rare	*	
		Fe: common <u>or</u> easy to extract (NOT unreactive) any <u>three</u> from four	*	3
			Total	8
A5	(a)	$ZnO + C \rightarrow Zn + CO$ <u>or</u> $2ZnO + C \rightarrow 2Zn + CO_2$	*	1
	(b)	(i) No separation both liquids/Zn will not distill	* *	2
		(ii) No separation both gases/boiled	* *	2
		(iii) use heat from waste gases/ cooling metals	*	1
	(c)	(i) Sr Zn Cr Rh		
		Sr most reactive	*	1
		Zn above Cr (anywhere) (ignore Rh)	*	1
		(ii) Any two correct statements relating observation <u>to position in series</u> NB reduce/displace more reactive needs amplification	**	2
			Total	10
			SECTION A	<u>48</u>

B1

Problems		Solutions	
No petrol/diesel/ bitumen/lube oil	*	bitumen alternative	*
		car share	*
		public transport	*
		lube oil alternative	*
No oil/gas to use as fuel/burn	*	specific alternative car fuel	*
		walk/cycle	*
No specified chemical product (accept plastic)	*	2x specific alternative power generator (wind/nuclear/waves/coal etc)	**
		specific method of saving energy (lights out/insulate)	*
		avoid use of oil <u>as fuel</u> (related to chemicals use)	*
		recycle or re-use	*
		specific alternative HC source/ e.g. coal/sugar)	*
		specific alternative material (e.g. paper bags)	*

ANY 6 from 13

Total 9

B 2

(a) (i) in ionic: electrons transferred *
forming charged particles/ions *
in covalent: electrons shared *
in pairs *
(diagrams acceptable)

(ii) ionic high mpt *
ionic conduct when molten/in solution *
ions attract *
ions free/move *
(or reverse statements)

ANY 7/8 7

(b) Similarities
Detail required
same number of outer electrons i.e. 7
diatomic or e.g. Cl_2 and Br_2
coloured e.g. Cl green or e.g. Cl green and Br brown

form X^- e.g. Cl^- Cl^- and Br^-

or form ionic compounds with metals
form insoluble AgX
antiseptic properties

any 2

Differences
2 specified different states
/reactivity trend for three (eg displacements)
/reactivity trend for Group
2 specified AgX colours
2 specified different colours
(Colours scores only once (either as similarity or difference)

any 2 4

(c) egs Cl_2: kills bacteria *
can also poison man/irritant *
PVC: useful plastic *
non biodegradable *
(pesticides:) kill insects
pollute and kill in food chain
NaCl: flavoring
causes heart disease
each substance
for advantage *
for disadvantage *

4

15

Section B 24

Total 72
SPG 4
Total 76

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