

GCSE

Chemistry

Session: 1994 June
Type: Mark scheme
Code: 1375



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 <u>or</u> O ₂ (<u>NOT</u> 0)	1
(b)	Sulphuric <u>or</u> sulphurous <u>or</u> hydrogen sulphide	1
(c)	Silver, gold, platinum, copper (<u>not</u> aluminium or lead)	1
(d)	Blue/purple or equivalent	1
(e)	Calcium <u>or</u> argon	1
(f)	Any named group 1 element <u>or</u> Cu <u>or</u> Ag (NAME <u>or</u> symbol) (Charge <u>not</u> required)	1
TOTAL		6
<hr/>		
2(a)(i)	4	1
(ii)	3	1
(iii)	The pupil should test more known colours in the experiment <u>OR</u> Use many solutions until it worked. <u>OR</u> Compare with other colours. <u>NOT</u> reference to different solvents <u>or</u> different lipsticks <u>or</u> leave longer <u>NOT</u> "more experiments" unless explained	1
(b)(i)	To help increase the <u>rate</u> at which the colour dissolves: <u>OR</u> Correct reference to increased <u>surface area</u> <u>OR</u> more easily dissolved. <u>OR</u> 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) <u>OR</u> Ethanol dissolves colour better <u>OR</u> extracts colour easier (If reference is made such as "ethanol <u>reacts</u> 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	1
		B A D C	
(b)	Sugar being dissolved (A)	No others	1
		No multiple answers	
(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 <u>or</u> freezing(1) i.e. process/change of state (Cooling/explaining cooling(1) i.e. cause of process ((temperature idea) (i.e. temperature lower <u>BUT NOT</u> clouds rising unless (cooling implied (KEY WORD - a temperature type word		2
(b)(i)	The water is hard <u>OR</u> pipes and boilers could be furred <u>OR</u> no lather when washing <u>OR</u> More soap used <u>OR</u> Scale formed. <u>OR</u> Scum formed (Any <u>one</u> idea)		1
(ii)	Add chlorine/chlorination/O ₃ Allow boiling <u>or</u> sterilising tablets		1
		TOTAL	6

5(a)(i)	The bromine is decolourised. <u>OR</u> The colour disappears. (<u>Final</u> colour to be marked) Do <u>NOT</u> accept "goes clear" or "the colour changes"	1
(ii)	Plastic bags, pipes, food containers. Any reasonable use which you know is correct (including "packaging") (<u>NOT</u> making plastics)	1
(b)(i)	Cracking	1
(ii)	To speed up the reaction <u>OR</u> change/alter the rate (<u>NOT</u> efficiency) <u>OR</u> allows reaction at a lower temperature	1
(iii)	$C_2H_4 + HOH \rightarrow C_2H_5OH$ (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 (<u>NOT</u> "join the dots") (Visible points <u>not</u> needed) Curve consequential (Bar Chart Max 1 mark)	3
(ii)	210 - 225°C (1) working on graph (by arrow or lines drawn etc)(1) These two marks are consequential to their graph	2
(iii)	The more carbons the higher the b.pt., stated or implied Right idea, award the mark (even if actual statement wrong)	1
(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 (<u>NOT</u> a pollution answer <u>NOT</u> Africa has none i.e. gross overstatement)	Any ONE answer
	TOTAL	12

6(a)(i)	5		1
(ii)	4		1
(iii)	3	All 4 marked strictly as per mark scheme	1
(iv)	X ³⁺ , B ³⁺		1
(b)(i)	3Mg + X ₂ O ₃ ----> 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 <u>either</u>		
	(Mg gains oxygen/reference to Mg as a		
	(reducing or X ₂ O ₃ as an oxidising agent		
	(<u>OR</u> X ₂ O ₃ loses oxygen		2
(iii)	Heat is given out		
	OR Temperature rises		
	OR Energy released/lost		1
		TOTAL	8
<hr/>			
7(a)(i)	hydrogen		1
	accept H ₂		
(ii)	ammonium nitrate (NOT ammonia nitrate)		
	accept correct formula		1
(b)(i)	reaction <u>rate</u> increased (<u>Rate</u> 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)

$$\text{Ca} + \text{H}_2\text{O} \text{ ----> } \text{Ca}(\text{OH})_2 + \text{H}_2$$
Balancing (1)

$$\text{Ca} + 2\text{H}_2\text{O} \text{ ----> } \text{Ca}(\text{OH})_2 + \text{H}_2$$
 (A "calcium oxide" answer scores MAXIMUM 1 mark overall)
 The balancing mark is only awarded if $\text{Ca}(\text{OH})_2$ 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) <u>NOT</u> impurities/residues	1
(iii)	Does not <u>react</u> 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 <u>OR</u> because it is acidic (1) Reason <u>OR</u> Limestone dissolves (1) Observation because it is a base (1) Reason i.e. Observation - one mark Reason - one mark <u>NB</u> "CO ₂ evolved" can score <u>either</u> as observation <u>or</u> reason	2
(ii)	Use indicator paper (named or otherwise) <u>OR</u> Measure pH <u>OR</u> 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 <u>NOT</u> fair test	1
	TOTAL	11
<hr/>		
10(a)	X=Iron ore, iron oxide, haematite (ignore oxidation state) Y = slag, calcium silicate (<u>NO</u> marks for formulae)	2
(b)(i)	Reaction D <u>or</u> equation	1
(ii)	Reaction E <u>or</u> equation	1
(iii)	Reaction A <u>or</u> equation playing the field - no marks! DEAD or DEAE	1
(iv)	Reaction D/E <u>or</u> 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 <u>or</u> less landfill sites needed Resources prolonged e.g. less use of raw materials (<u>TWO</u> distinct reasons from three categories)	2
(ii)	Two objects (<u>ANY</u> sensible ones) Cars, bikes, cans - 2 easy marks (<u>NOT</u> coke cans)	2
	TOTAL	10
<hr/>		
		21

11(a)(i)	Hydroelectric		1
(ii)	methane <u>or</u> other correctly named fuel (e.g. alkane/ethanol)		1
	<u>NOT</u> natural gas or oil		
(iii)	The production is cheaper i.e. cost argument		
	<u>OR</u> Al production needs large amounts of electrical energy (or electricity).		
	<u>NOT</u> pollution answers		1
(b)(i)	$S + O_2 \rightarrow SO_2$		1
(ii)	Dissolves <u>or</u> 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)		
	<u>NOT</u> general polluting of air		2
	<u>ANY TWO</u> different ideas (from the four categories)		
(c)(i)	44		1
(ii)	$C + O_2 \rightarrow CO_2$		
	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

Total
SPG
Grand total

94
5
99

10

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 i.e. $\text{Li}_2\text{CO}_3/\text{MgCO}_3/\text{CaCO}_3/\text{SrCO}_3/\text{BaCO}_3/\text{PbCO}_3/\text{Ag}_2\text{CO}_3$	*	1
	(b)(Y)	(i)	Ammonium sulphate	*	1
		(ii)	Fertiliser (only if NH_4^+ salt in (i))	*	1
		(iii)	$\text{NH}_4^+ + \text{OH}^- \rightarrow \text{NH}_3 + \text{H}_2\text{O} / \text{NH}_4\text{OH}$ (or if molecular : 1 for formula, then 1 for balance) Accept equation for any ammonium salt	**	2
	(c)(Z)	(i)	$\text{Cu}(\text{NO}_3)_2$ NB formula	*	1
		(ii)	$\text{Fe} + \text{Cu}^{2+} \rightarrow \text{Cu} + \text{Fe}^{2+}$ 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	*	1
			conditional on a correct reagent (For Group II) metal allow hydroxide/ CO_2 /aqueous) or Group I)		

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 <u>i.e. (a)(ii) x 4</u> 400/46 <u>i.e. divide by 46</u> 8.69 ---> 8.70 (or consequential on correct use of (a)(ii) answer) Just correct answer scores 3 Ignore significant figures	*	1
	(b)	(i)	Calcium carbonate NAME	*	1
		(ii)	(HCOO) ₂ Ca or CO ₂ + H ₂ O or H ₂ CO ₃ Balanced (MgCO ₃ scores throughout (b)) (or balanced ionic equation scores two)	*	1
		(iii)	Wash anything relevant/) stopper the bottle) because toxic/poisonous/) corrosive/burns)	*	1
					Total

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)	$ZnO + C \rightarrow Zn + CO$	*	1	
		<u>or</u> $2ZnO + C \rightarrow 2Zn + CO_2$			
	(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	

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
coloured e.g. Cl green or

e.g. Cl₂ and Br₂
e.g. Cl₂ 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 Cl₂: 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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