GCSE EXAMINATIONS SUMMER 1994

MARKING SCHEME

for

CHEMISTRY (1375/2)

PAPER 2

Notes:

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<table>
<thead>
<tr>
<th>QUESTION</th>
<th>KEY POINTS</th>
<th>MARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(a)</td>
<td>Oxygen or $O_2$ (NOT 0)</td>
<td>1</td>
</tr>
<tr>
<td>(b)</td>
<td>Sulphuric or sulphurous or hydrogen sulphide</td>
<td>1</td>
</tr>
<tr>
<td>(c)</td>
<td>Silver, gold, platinum, copper (not aluminium or lead)</td>
<td>1</td>
</tr>
<tr>
<td>(d)</td>
<td>Blue/purple or equivalent</td>
<td>1</td>
</tr>
<tr>
<td>(e)</td>
<td>Calcium or argon</td>
<td>1</td>
</tr>
<tr>
<td>(f)</td>
<td>Any named group 1 element or Cu or Ag (NAME or symbol) (Charge not required)</td>
<td>1</td>
</tr>
</tbody>
</table>

**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
3(a) HCl and NaOH (B) Letters only 1
   (b) Sugar being dissolved (A) B A D C No others 1
   (c) Ammonia being bubbled into water (D) No multiple answers 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
         (Any one idea) 1
   (ii) Add chlorine/chlorination/O₃
        Allow boiling or sterilising tablets 1

   TOTAL 6
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")
(NOT making plastics) 1

(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) \( \text{C}_2\text{H}_4 + \text{HOH} \rightarrow \text{C}_2\text{H}_5\text{OH} \) (accept \( \text{C}_2\text{H}_6\text{O} \)) 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\(^\circ\)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
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  Any
Economic considerations (more affordable) ONE
The need i.e. climate considerations answer
Technology/industry slant
(NOT a pollution answer
NOT Africa has none i.e. gross overstatement) TOTAL 12

12
6(a)(i)  5
(ii)  4
(iii) 3
(iv)  X^{3+}, B^{3+}

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

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

(b)(i) 3Mg + X_2O_3 \rightarrow 3MgO + 2X \text{(NOT X_2)} \text{ (Fully balanced)}
Allow multiples

7(a)(i) hydrogen
accept H_2
(ii) ammonium nitrate (NOT ammonia nitrate)
accept correct formula

(b)(i) reaction rate increased (Rate idea needed)
(ii) reaction rate decreased/reaction slower/accept reaction "slow"
(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

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
NOR crumb structure idea
NOR makes food look better

(iii) 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

8(a)(i) Magnesium oxide/ MgO (1 for each) 2
(ii) Greater/increased reaction/burning/surface area
NOT blown around
(iii) ( Fireworks. flares, alloys, flash bulbs
( Bolting to ships/oil pipelines/corrosion protection
( MUST be for Mg element)

(b)(i) Calcium, magnesium, iron, copper (ALL correct) 1
(ii) Lighted splint (1) squeaky pop (1) (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 + H₂O ----> Ca(OH)₂ + H₂
Balancing (1)
Ca + 2H₂O ---> Ca(OH)₂ + H₂
(A "calcium oxide" answer scores MAXIMUM 1 mark overall)
The balancing mark is only awarded if Ca(OH)₂ and H₂ are
rect 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/
NOR electric cables or plating or wires

TOTAL 1
9(a)(i) Filtration

(ii) Solid/insoluble/the metal (allow steel or sediments)
    NOT impurities/residues

(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.

(b)(1) Bubbling/gas evolved/effervescence (1) Observation
    CO₂ 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 "CO₂ evolved" can score either as observation or reason

(ii) Use indicator paper (named or otherwise)
    OR Measure pH OR no more limestone dissolved
    (no result expected)

(c) Iron is more reactive than nickel (1) displacing it (1)
    Result (1) reason (1)

(d)(i) D

(ii) A

(iii) For comparison/control
    NOT fair test

TOTAL 11

10(a) X=Iron ore, iron oxide, haematite (ignore oxidation state)

Y = slag, calcium silicate
(NO marks for formulae)

(b)(i) Reaction D
    or equation

(ii) Reaction E
    or equation

(iii) Reaction A
    playing the field - no marks!
    DEAD or DEAE

(iv) Reaction D/E
    or equation

(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)

(ii) Two objects (ANY sensible ones)
Cars, bikes, cans - 2 easy marks
(NOT coke cans)

TOTAL 10
11(a)(i) Hydroelectric

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

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

(b)(i) $S + O_2 \rightarrow SO_2$

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

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

(c)(i) $C + O_2 \rightarrow CO_2$

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

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

TOTAL 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:

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<td>3</td>
<td>Paper 3</td>
</tr>
<tr>
<td>4</td>
<td>Coursework</td>
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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

**Threshold performance**
Candidates spell, punctuate and use the rules of grammar with reasonable accuracy; they use a limited range of specialist terms appropriately.

**Intermediate performance**
Candidates spell, punctuate and use the rules of grammar with considerable accuracy; they use a good range of specialist terms with facility.

**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.

**Allocation of Marks**

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<td></td>
</tr>
<tr>
<td>4—5</td>
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GCSE EXAMINATIONS SUMMER 1994

MARKING SCHEME

for

CHEMISTRY (1375/3)

PAPER 3

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Mark and Answer Scheme

A1
(a)(X) (i) Zinc carbonate ONLY
(ii) Allow (consequential) formula of any white, insoluble, carbonate
\[ \text{i.e. } \text{Li}_2\text{CO}_3/\text{MgCO}_3/\text{CaCO}_3/\text{SrCO}_3/\text{BaCO}_3/\text{PbCO}_3/\text{Ag}_2\text{CO}_3 \]

(b)(Y) (i) Ammonium sulphate
(ii) Fertiliser (only if \( \text{NH}_4^+ \) salt in (i))
(iii) \[ \text{NH}_4^+ + \text{OH}^- \rightarrow \text{NH}_3 + \text{H}_2\text{O} / \text{NH}_4\text{OH} \]
(2 marks – if molecular \( \text{NH}_4 \) for formula, then \( \frac{1}{2} \) for balance)
Accept equation for any ammonium salt

(c)(Z) (i) \( \text{Cu(NO}_3\text{)}_2 \) NB formula
(ii) \( \text{Fe} + \text{Cu}^{2+} \rightarrow \text{Cu} + \text{Fe}^{2+} \) only

(d)
- soluble carbonate
- For ANY insoluble carbonate: (coloured is OK)
- appropriate soluble metal compound
- (refer back to a(i))
- mark first two independently
- in aqueous/solution/water
- conditional on a correct reagent
- (For Group II metal allow hydroxide/\( \text{CO}_2 \)/aqueous)
- or Group I

Total 11
A2 (a) ethanol
hydrogen
* 1
* 1
(b) calcium carbonate
sodium chloride
* 1
* 1
(c) ethanol
lead nitrate
* 1
* 1
(d) sodium chloride
iron
* 1
* 1
(e) calcium carbonate
lead nitrate
If formula given accept but must be correct
* 1
* 1
Total 10

A3 (a) (i) 46 (ignore g)
* 1
(ii) 100 (ignore units)
* 1
(iii) 100g in 250
400g in 1000 cm³ i.e. (a)(ii) x 4
400/46 i.e. divide by 46
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)₂Ca or CO₂ + H₂O or H₂CO₃
Balanced
(MgCO₂ 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 rusts/does not bend easily/hard more reactive than Cu
* 1
(b) W/Pb dense (not heavy) or Pb dense
unreactive or cheap
(Pb only) * 1
(c) high m pt or low reactivity or glows better
or high resistance
(anywhere in (c))
(reversed statements acceptable)
* 1
(d) K: reactive or difficult to extract
or compound stable
or requires electricity
Pb: unreactive or easy to extract
or compounds unstable
W: rare
Fe: common or easy to extract (NOT unreactive)
any three from four
* 3
Total 8

A5
(a) ZnO + C \rightarrow Zn + CO
or 2ZnO + C \rightarrow 2Zn + CO₂
* 1
(b) 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
Zn above Cr (anywhere)
(ignore Rh)
* 1
(ii) Any two correct statements
relating observation
at position in series
NB reduce/displace
more reactive needs amplification
** 2
Total 10

SECTION A 48
<table>
<thead>
<tr>
<th>Problems</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>No petrol/diesel/bitumen/lube oil</td>
<td>bitumen alternative</td>
</tr>
<tr>
<td></td>
<td>car share</td>
</tr>
<tr>
<td></td>
<td>public transport</td>
</tr>
<tr>
<td></td>
<td>lube oil alternative</td>
</tr>
<tr>
<td>No oil/gas to use as fuel/burn</td>
<td>specific alternative car fuel</td>
</tr>
<tr>
<td></td>
<td>walk/cycle</td>
</tr>
<tr>
<td>No specified chemical product</td>
<td>2x specific alternative power generator</td>
</tr>
<tr>
<td>(accept plastic)</td>
<td>(wind/nuclear/waves/coal etc)</td>
</tr>
<tr>
<td></td>
<td>specific method of saving energy</td>
</tr>
<tr>
<td></td>
<td>(lights out/insulate)</td>
</tr>
<tr>
<td></td>
<td>avoid use of oil as fuel</td>
</tr>
<tr>
<td></td>
<td>(related to chemicals use)</td>
</tr>
<tr>
<td></td>
<td>recycle or re-use</td>
</tr>
<tr>
<td></td>
<td>specific alternative HC source/e.g. coal/sugar</td>
</tr>
<tr>
<td></td>
<td>specific alternative material (e.g. paper bags)</td>
</tr>
</tbody>
</table>

ANY 6 from 13

Total 9
(a)  
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)

(b)  
**Similarities**
Detail required
same number of outer electrons i.e. 7
diatomic or
coloured e.g. Cl green or
form X⁻ e.g. Cl⁻

**or form ionic compounds with metals**
form insoluble AgX
antiseptic properties

**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)

Total 72
SPG 4
Total 76
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<tr>
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