

Principal Assessor Report 2002

Assessment Panel:

Chemistry

Qualification area

**Subject(s) and Level(s)
included in this report**

Chemistry (Standard Grade)

Statistical information: update

Number of entries in 2001	
Pre appeal	23284
Post appeal	23237

Number of entries in 2002	
Pre appeal	22820
Post appeal	

General comments re entry numbers

The figure for 2002 is similar to that for 1998/1999. In 2000/2001, there were about 500 more entries. In 1997, there were 24083 entries.

General comments

The ability of the candidate group was thought to have been marginally lower than in 2001 and this is reflected in the distribution of overall awards.

Candidates coped very well with the General paper, but a significant number of candidates scored low marks in the Credit paper. It was noticeable that, in the Credit paper, marks were polarised in such a way that significant numbers of candidates had either very high or very low marks, with few middle range marks. A significant number of markers commented that many candidates were clearly not Credit standard and regretted the practice of presenting all candidates at both levels.

Grade boundaries at C, B and A for each subject area included in the report

Knowledge and Understanding

Maximum Mark

General = 30

Credit = 30

Grade boundaries expressed as a percentage mark in brackets

Year	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7
2002	20 (66.7%)	14 (46.7%)	17 (56.7%)	12 (40%)	9 (30%)	0	0

Problem Solving

Maximum Mark

General = 30

Credit = 30

Grade boundaries expressed as a percentage mark in brackets

Year	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7
2002	19 (63.3%)	13 (43.3%)	19 (63.3%)	15 (50%)	12 (40%)	0	0

Comments on grade boundaries for each subject area

Although the Grade boundaries in KU (Credit) are the same as in 2001, the percentage of candidates scoring Grade 1 and Grade 2 is somewhat lower, reflecting an impression that candidates are being presented for the examination without a firm grasp of all the basic information of the course.

The Grade boundaries in PS reflect in part the relative difficulty of some of the PS questions in the Credit paper and take account of the fact that the 2001 General paper was rated as being on the easy side.

Comments on candidate performance

General comments

In general terms, candidates appeared to perform better in Knowledge and Understanding than in some aspects of Problem Solving. It was notable that in the Credit paper candidates did not reason beyond a single step.

Areas of external assessment in which candidates performed well

Many candidates performed well in grid questions in both the General and Credit papers.
(each * refers to the presence of a PS mark in the question(s))

General Paper:

- 4 (types of process)
- 7 (control of factors)*
- 8 (conductivity – most candidates scored at least 1)**
- 10(b) (bar chart)**
- 11(c) (advantage of battery)
- 12(a)(c)(d) (reactivity of metals, reactivity of potassium, test for hydrogen)**
- 13(b) (bonding in sulphur dioxide)*
- 16(b) (application of filtration)*
- 17(b) (insolubility of calcium phosphate)*
- 18(b)(c) (information from graph)**

Credit Paper

- 4 (hydrocarbons)**
- 6 (nuclide notation)
- 10 (polymers)
- 12 (titanium, including % mass calculation)*
- 13(a) (spectator ions)
- 14(b)(c) (graph)***
- 16(c) (addition of water)**

Areas of external assessment in which candidates had difficulty

In general terms, candidates presented themselves for the examination insufficiently prepared in terms of basic knowledge. This was remarked upon by a significant number of markers, especially at Credit level. (each * refers to a the presence of a PS mark in the question(s))

General paper

- 2(b) (identification of diatomic species)
- 5(b) (identification of a neutraliser)
- 6(a) (water as a product in combustion)*
- 11(except c) (battery question)**
- 14(b)(i) (enzymes)
- 16(a) (identification of neutralisation reaction)
- 17(a)(ii) (lightning creates N oxides)

Credit paper

- 5(b) (isotopes)
- 8(b) (rusting equations)
- 11(a)(i)(iii) (hydrolysis and denaturation by heat)*
- 13(c)(ii) (ion – bridge, precipitation)*
- 14(a) (completing drawing of gas collection)**
- 14(d) (writing ionic formulae)
- 17(a)(ii) (alcohol structure)*
- 17(b) (reduction by aluminium oxide)*
- 18(d) (ammonia percentage yield relationship)*
- 19 (titration)*

Areas of common misunderstanding

General Paper

- Q15 A substantial number of markers commented that candidates appeared not to know the word “source” and interpreted the question as asking for a **use** of nitrogen.
- Q19(b) The word “form” caused difficulties for some candidates, who took it to refer to carbon in the form of a rod, rather than in the form of graphite.

Credit Paper

- 15(b)(i) The use of the word “plant” in the context of the Blast Furnace may account for the significant numbers of candidates who did not gain this mark. Equally, it may be that candidates were simply ill-prepared.
- 17 Many candidates appear not to have read the question carefully, and, as a result, linked the name of the alcohol to the type of product.

Recommendations

Feedback to centres

Numbers of candidates continue to circle more than two boxes in grid questions. In open grids, large numbers of candidates circle one box only, although the practice for several years has been to have two correct responses to such questions.

In view of the striking lack of basic knowledge displayed by many candidates, and commented on by a significant number of markers, teachers should emphasise to candidates the need to learn basic information much more thoroughly, and examine strategies by which this can be accomplished.

Appendix

Setting of Grid Items

- i) Candidates should have sufficient knowledge to answer the question against the information in ALL the boxes of a grid. For example, if the question is “Which gases decolourise bromine water?”, it is unfair to include ammonia in the grid, since candidates will not have tested ammonia with bromine.
- ii) Boxes should contain the minimum of text, and where technical words and phrases are used they should be ones with which the candidates are familiar.
- iii) Where there is an introduction to a question, this should be as brief as possible and be included only to set the question in context.
- iv) Candidates should be provided with answer matrices for each question and be asked to ring the letter(s) of the appropriate answer(s) in the answer matrices.
- v) Letters used to designate grids should also be boxed.
- vi) Boxes in the grid should be laid out in the most appropriate way, e.g. if sentences or long statements are used in a grid, the presentations should be as follows:

A	
B	
C	

etc

- vii) Hyphenated words in two separate lines in a grid should be avoided.
- viii) No chemically incorrect information should be included in the grid.
- ix) The number of boxes in a grid should be related to the amount of information to be conveyed.
In and after 1994:
grids comprising three boxes will not be used.
no grid items will comprise more than six boxes.
- x) 4 box grid questions with 2 unconnected responses should not be employed.
- xi) The maximum number of correct responses will be two.
all ‘closed’ grid items will be worth one mark.
the maximum number of marks to be awarded for any ‘open’ grid item will be two.
- xii) In the case of “open” questions (see below), the stem of the item must be grammatically correct in both its singular and plural forms.

Marking of Grid Items

Essentially, two types of grid item exist – “closed” items, where the stem of the question clearly indicates the number of responses required, and “open” items, where the stem makes no such specification.

“Closed” Grid Items

These are items which require candidates to demonstrate mastery more than once and have the number of correct responses indicated in the stem.

To gain the mark(s), ALL correct responses must be given. No partial marks should be awarded.

The following is an example of a “closed” grid item.

A	CH ₄	B	H ₂ S	C	N ₂
D	O ₂	E	CaCl ₂	F	NH ₃

Which TWO boxes show the formula for a substance which exists as diatomic molecules?

This item is worth 1 mark, for which both correct responses are required. Any variation from this scores zero marks,

- i.e.
- one response (correct or incorrect) – no marks
 - one correct and one incorrect response – no marks
 - three responses – no marks

“Open” Grid Items

These are items which require candidates to demonstrate different aspects of Knowledge and Understanding or Problem Solving and do not have the number of responses indicated.

The following is an example of an “open” grid item.

Each box in the grid shows the name or the formula for a compound.

A	$\begin{array}{c} \text{H} \\ \\ \text{H} - \text{C} - \text{OH} \\ \\ \text{H} \end{array}$	B	butane	C	$\begin{array}{c} \text{H} \\ \\ \text{H} - \text{C} - \text{H} \\ \\ \text{H} \end{array}$
D	ethene	E	$\begin{array}{ccccccc} & \text{H} & \text{H} & \text{H} & & \text{H} & \\ & & & & & / & \\ \text{H} - & \text{C} & - \text{C} & - \text{C} & = & \text{C} & \\ & & & & & \backslash & \\ & \text{H} & \text{H} & & & \text{H} & \end{array}$	F	ethanol

Which box (or boxes) shows a saturated hydrocarbon?

This item is worth 2 marks and in marking it a cancelling mechanism comes into operation whenever the number of answers given exceeds the number of correct responses.

e.g. BC 2 marks
BD or CE 1 mark
BCD 1 mark
ABF 0 marks
BCDE 0 marks
ABCDF 0 marks.