



GENERAL CERTIFICATE OF EDUCATION
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EXAMINERS' REPORTS

**CHEMISTRY (New)
AS/Advanced**

January 2009

Statistical Information

This booklet contains summary details for each unit: number entered; maximum mark available; mean mark achieved; grade ranges. *N.B. These refer to 'raw marks' used in the initial assessment, rather than to the uniform marks reported when results are issued.*

Annual Statistical Report

The annual *Statistical Report* (issued in the second half of the Autumn Term) gives overall outcomes of all examinations administered by WJEC.

Chemistry (New)
General Certificate of Education
January 2009
Advanced Subsidiary/Advanced

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Unit Statistics

The following statistics include all candidates entered for the unit, whether or not they 'cashed in' for an award. The attention of centres is drawn to the fact that the statistics listed should be viewed strictly within the context of this unit and that differences will undoubtedly occur between one year and the next and also between subjects in the same year.

Unit	Entry	Max Mark	Mean Mark
CH1	1443	80	40.0

Grade Ranges

A	52
B	46
C	40
D	34
E	29

N.B. The marks given above are raw marks and not uniform marks.

CH1 (New)

General Comments

This was the first examination for the new GCE specification and it was pleasing to see an increase of nearly 20% in the number of candidates taking CH1 as first timers. The range of marks obtained by candidates taking this unit was very wide. The paper raw mark total has increased to 80 but only about ten candidates failed to obtain a total in double figures. There were about fifteen candidates who gained a very creditable 70, or more, marks.

The examiners had tried to give the paper a new 'flavour' to reflect current changes in GCSE Sciences. There were more questions on industrial process and data processing questions, where candidates were invited to suggest the best course of action in new situations. At INSET some teachers expressed a little concern about this new focus but the examiners noticed that the candidates often gained high marks for this type of question. One problem with setting this newer type of question is that more reading is needed and this tended to make the paper appear longer. As a result, the examiners looked at the responses to see if the last question appeared to have been rushed. There was insufficient evidence to form a conclusion about this, as parts of the last question were demanding and were sometimes left blank.

The standard of numerical work continues to show improvement but candidates are again advised to look at their answer to see if what they have obtained is feasible.

As reported previously in AS papers, far more marks are lost in basic recall than in dealing with data given in new situations.

Candidates are, once again, advised to read the questions carefully, so that they answer what is actually required.

Section A

- Q.1** (a) A surprising number of candidates did not obtain this first easy mark; often the wrong symbol was given. In (ii), the half life calculation was an easy mark for nearly everybody.
- (b) The electron configuration of magnesium was nearly always correct.
- Q.2** This was a simple mole calculation. Surprisingly, a number of candidates did not read the question carefully enough and used the relative molecular mass of calcium carbonate instead of the required calcium oxide. Sadly, a few candidates used atomic numbers instead of relative atomic masses.
- Q.3** (i) The arithmetic was often correct but many people obtained a positive answer and this was penalised.
- (ii) Calculations on atom economy are new to AS and the answer was generally correct but some candidates did not appear to have been taught this topic.
- Q.4** (i) If the examiners had not been a little generous with the many loose definitions provided, the number of really correct answers would have been much fewer. Too many responses were clumsy and inaccurate. Candidates should examine what they have written and see if it really makes sense. References to 'it' leave the examiner with a dilemma.
- (ii) Similar comments to (i). Candidates should beware of simplistic GCSE style explanations based on the stability of 'filled shells'. A typical loose comment spoke of 'it is because the electron being removed has a larger effective nuclear charge'.

Section B

- Q.5** (a) The question asked 'how you would explain to the **general public**.....' Too often the response involved sophisticated descriptions of hydrogen ion concentration. All the examiners required was a mention of acidity having a pH value of less than 7 and the smaller the number then the more acidic it was. This was not always given.
- (b) (i) It was not uncommon to see 'because sulphur dioxide is a proton donor' – how can it be?! The question asked candidates to use the equation – if more had done this, then more would have obtained credit.
- (ii) The explanation of dynamic equilibrium is still being given incorrectly by some candidates, who implied that nothing was happening.
- (iii) Many candidates used Le Chatelier's principle correctly.

- (c) Not every candidate could think of **two** disadvantages. Often the second one seemed fanciful. The commonest acceptable answers suggested that 'carbon dioxide was formed - this contributes to global warming' and 'calcium carbonate removal causes environmental / aesthetic problems in the countryside'. The examiners did not accept that, when carbon dioxide was produced, this was harmful or a pollutant. A more detailed comment was needed at this level.
- (d) (i) This question concerned the concentration of sulfur dioxide in the air. In general, this calculation was handled competently, with candidates gaining many of the six available marks. The handling of small numbers in such calculations has steadily improved in recent examinations.
- Q.6** (a) (i) A number of candidates did not read the graph accurately enough and were penalised.
- (ii) Most correct answers mentioned colorimetry as a suitable method for measuring rates. Those who suggested using tangents drawn on the graph were also credited.
- (iii) Many candidates drew the required curve correctly but a number could not then describe clearly why this curve was obtained.
- (iv) This was a discriminating question and only stronger candidates correctly used the mole ratio in the equation as part of their answer.
- (v) Acceptable ways to calculate the initial rate were by using the 'flat' part of the curve at the beginning of the graph or by taking a tangent at a suitable place on the curve. This question was generally answered quite well.
- (b) (i) Many candidates gained both marks here for deductions from the table.
- (ii) This, too, required a deduction from the table and was answered with competence.
- (iii) The Haber process, using an iron catalyst, was the most common correct answer. The spelling of 'Haber' was often incorrect.
- Q.7** (a) Standard conditions were well known.
- (b) (i) Nearly all candidates could define Hess's law.
- (ii) The question required candidates to use the figures given, in their answer. Many correct responses were seen, with only a few candidates neglecting to use any numbers in their answers.
- (iii) This question asked candidates about bromine **atoms**. Some candidates became muddled about the bimolecular species of bromine, even though this was indicated in the stem of the question.

- (c) (i) This question was based on the practical procedure for determining the enthalpy of a neutralisation. The number of moles of hydrobromic acid used was usually correct.
- (ii) This reaction is an exothermic change and it was not uncommon to see the negative sign omitted. The question asked for the answer to be given in kJ mol^{-1} . This was not always done and numbers and units were often jumbled.
- (iii) The problem of heat loss provided an easy mark for many.
- (iv) Very few candidates realised that the sodium hydroxide was in excess.
- Q.8** (a) (i) This proved to be troublesome for many candidates. An explanation of the appearance of a line spectrum rather than a continuous spectrum needs to be specific and definitive. Too often, the answers provided were rambling and unconvincing.
- (ii) The acquisition of all four marks seemed beyond many candidates. All too often, the examiners were told that $E = f\lambda$ rather than $E \propto f$ and $E \propto 1/\lambda$. Sadly, the responses in the table often indicated guesswork rather than understanding, even if they had obtained two marks for the relationship between energy, frequency and wavelength.
- (b) (i) Most candidates gave a correct equation to represent the first standard molar ionisation energy of neon but the states were sometimes omitted.
- (ii) The explanation of the term 'relative isotopic mass' was often poorly done and this is an area that needs attention.
- (iii) Many candidates failed to state that 'relative isotopic mass' referred to one particular isotope and 'relative atomic mass' to a weighted average of the isotopes present.
- (iv) This was a simple calculation but required understanding of what was being asked. Sadly, many candidates did not know how to do this mole calculation.
- Q.9** (a) (i) Nearly all candidates deduced a correct answer from the data in the table.
- (ii) This too, was answered well and a range of acceptable responses was seen.
- (b) (i) Very few candidates could give an account of how a solution, too concentrated for a titration, could be accurately diluted. Essentially, it was rather like preparing a standard solution but starting with an accurately measured volume of solution. The examiners felt that not every question should be essential recall but some should require clear application of what they had learnt and performed in their practical work. Sadly, few could attempt this question in a meaningful way and many described a simple acid-base titration.

- (ii) The mole calculation was generally quite well done but some candidates could not manipulate a change of units effectively. The final part needed the mention of an indicator. This was a generous mark but, surprisingly, some simply said that a colour change would occur. This was insufficient for such an easy mark.

Mr Eurig Thomas has written the following comments about the performance of those candidates taking the examination through the medium of Welsh.

Roedd safon yr iaith ysgrifenedig Cymraeg yn gymharol i'r Saesneg yn y papur yma. Nid oedd yna unrhyw arwydd fod cyfrwng y cwestiynau yn effeithio ar safon yr atebion. Roedd y patrwm ateb, yn enwedig yn adran B, bron yn union yr un peth. Wnaeth ymgeiswyr sgorio'n uchel yn y tri chwestiwn cyntaf, yn enwedig cwestiwn 6, ond yn siomedig yng nghwestiynau 8 a 9.

Roedd y mwyafrif o atebion anghywir yn dilyn yr un patrwm â'r canolfannau Saesneg. Er y derbyniwyd sawl cwyn am hyd y papur gan ganolfannau sy'n dysgu trwy gyfrwng y Gymraeg, ni welwyd llawer o ymgeiswyr yn gadael cwestiynau'n wag nac yn methu â gorffen y papur. Nid oedd yna unrhyw arwydd bod mwy o ymgeiswyr cyfrwng Cymraeg wedi methu â gorffen neu gwblhau'r arholiad o'i gymharu ag ymgeiswyr cyfrwng Saesneg.

The standard of written language in Welsh was equivalent to the English in this paper. There was no indication that the medium of the questions affected the standard of answers produced. The pattern of answering, particularly in Section B, was also virtually identical. Candidates scored highly in the first three questions, particularly question 6, but scored poorly in questions 8 and 9.

The majority of incorrect answers followed the same pattern as those in English medium centres. Despite several comments from Welsh medium centres about the length of the paper, very few Welsh medium candidates left questions un-answered or appeared to have difficulty in finishing the paper. There was no indication of a greater number of Welsh medium candidates failing to finish or complete the paper than English medium candidates.



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