



**General Certificate of Education**

**Chemistry 5421**

**CHM3/W Introduction to Organic Chemistry**

**Report on the Examination**

*2008 examination - January series*

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*Dr Michael Cresswell Director General.*

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## CHM3/W

### General

This paper continued the very successful on-screen CMI+ marking method. As in June 2007, candidates were not rigorous about presenting their answers on the specified pages of the script, but the examiners ensured that all of the work was viewed and marked, regardless of where the answers were written.

The structure of the paper and the scheme of marking ensured accessibility for all candidates. All marks on the paper were scored and full marks were seen. As in previous January sessions, very weak scripts tend not to occur, probably as a consequence of a large proportion of re-sit candidates at this session. Many candidates lost marks through their inability to complete and balance equations, but even the weakest could make some progress with the mechanisms. Centres should continue to encourage candidates to draw clear structures, to express their thoughts using sentences and to use appropriate chemical terminology. Care should be taken with organic structures.

### Section A

#### Question 1

This question was well answered and often high scoring. Part 1(a)(ii) was the least well answered part of the question. Candidates did not always express the idea that a petroleum fraction has a narrow boiling point range and is a mixture of hydrocarbons with similar boiling points. The main difficulty in 1(c)(i) and 1(d)(i) was a failure to arrive at the correct quantity of oxygen to balance each equation. In 1(d)(ii) the idea that ethanol can be made from renewable resources was known by a majority of candidates.

#### Question 2

This was a relatively high scoring question. In 2(a)(ii) candidates frequently failed to distinguish between chemical and physical properties or they placed the focus of their answer specifically on alkenes, which was not what the question asked. In 2(c), a common error was to draw pent-1-ene rather than its position isomer. In 2(d)(i), the idea that an empirical formula shows *the atoms of each element* is important. Part 2(e)(i) was demanding but produced some very good answers. The idea that the double bond is electron-rich and that it is this which induces a dipole in the bromine molecule, was well understood by many candidates.

#### Question 3

This question was quite well answered and candidates were not put off by the structures. The definition of stereoisomers continues to cause problems for some candidates, even though it has been asked recently. By contrast, the other parts of the question were accessible to those candidates who had prepared adequately. In part (d) the omission was usually the requirement that the potassium dichromate(VI) should be acidified.

**Question 4**

This was generally a well answered question which became progressively more demanding down the page. Candidates still have difficulty writing the equation for fermentation, which was required in part (d). In part (e) full marks were not common. Water was missed as a product or the catalyst failed to include the requirement to use *concentrated* sulphuric or phosphoric acid or the candidates failed to “show the structures of the organic compounds”, as required in the question.

**Question 5**

This was a relatively demanding question. Most candidates could start the mechanism but struggled to construct correct propagation steps in part (a). In part (b)(i) the usual problems with incorrect products ( $H_2$ ) or with balancing were seen. Part (c) discriminated well with the name of the product causing problems for some.

**Section B****Question 6**

The decision had been taken to place all of the ‘curly arrow’ mechanisms in one place on this paper and while this caused some marking difficulties, it proved easy for the candidates to decide which mechanism was which. In part (a) the names demanded were rigorously IUPAC and this discriminated in a fair way, with many candidates scoring at least two out of three marks.

In parts (b), (c) and (d), candidates generally knew the name of the mechanism and often scored at least one mark from their ‘curly arrows’. Possibly as a consequence of studying CHM4, weaker candidates included incorrect names such as nucleophilic addition and electrophilic substitution in their answers.

It is important to note that CMI+ will not allow the markers to award repeat errors as has occurred on past papers and therefore candidates may have suffered the same type of penalty more than once. Candidates should be advised to draw full structures and not use “sticks”.

**Mark Ranges and Award of Grades**

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.