

# 2010 CHIEF MARKER PUBLICATION REPORT ON MARKING

## INSTRUCTIONS FOR COMPLETION

- The report on marking is a comprehensive report that will serve the following three objectives:
  - Provide an evaluation of the question paper and marking guideline.
  - Provide an in-depth analysis of the nature of learner responses, which will facilitate feedback to teaching and learning.
- This report must be completed by the **CHIEF MARKER in conjunction with the senior markers.**
- The report must be completed in detail and single word responses will not be accepted.
- Where additional space may be required, use a separate page which must be appended to this report.
- The final report must be approved and signed by the Head of Examinations in the province.
- The report must be submitted to the responsible WCED official at the marking centre.

<b>SUBJECT</b>	<b>PHYSICAL SCIENCES</b>	
<b>PAPER</b>	<b>2</b>	
<b>GRADE</b>	<b>12</b>	<b>DURATION OF PAPER : 3H</b>
<b>PROVINCE</b>	<b>WCED</b>	
<b>CHIEF MARKER</b>	<b>NAME: M.E. DE VOS</b>	
	<b>CONTACT DETAILS: 083 651 5872</b>	

## PART ONE: EVALUATION OF QUESTION PAPER AND MARKING GUIDELINE

<b>1. COMMENTS ON SPECIFIC QUESTIONS. (SEE PART TWO QUESTION 1 AND 2 OF THIS DOCUMENT)</b>
Question 1: Performance of the candidates were fair – some still lack a basic knowledge of definitions and terminology – teachers need a ‘list’ of correct/accepted definitions of basic concepts.
Question 2: Candidates either obtained high marks or almost nothing – poor quality of teaching in some centres.
Question 3: Average performance – due to lenient memorandum. Candidates struggle with organic chemistry. Candidates do not have a basic knowledge of structural formulae and functional groups.
Question 4: Poor performance by many schools – only the bright candidates coped with the question. Candidates do not know what viscosity is and many weren’t able to explain the property in terms of intermolecular forces.
Question 5: Many candidates do not have an idea about reactions in organic chemistry – hydrolysis, hydration, dehydration, etc. The reason is poor teaching and candidates do not study enough.
Question 6: 6.1 was answered quite well because they only have to choose the correct term from the list. 6.2 Candidates struggled with the hypothesis and conclusion – candidates generally cannot identify variables and the relationship between them.
Question 7: Poor performance – fertilizers were not taught adequately and candidates struggled with the $K_c$ calculation.
Question 8: Easy question but many candidates could not mention the standard conditions and the values thereof – a most frequently asked question in previous years. Although similar questions were asked in previous years candidates still could not manage.
Question 9: Candidates do not know when to write a charge, they cannot write half reactions and still struggle with $E_{cell}$ calculations.
Question 10: Candidates could not write the balanced equation for the net reaction – very poor response from candidates. Reducing agent, oxidizing number, etc – terms not well taught.

## PART TWO: ANALYSIS OF CANDIDATES' RESPONSE TEMPLATE

<b>QUESTION 1</b>
It was well answered by well-prepared candidates. Average to good performance by the candidates. Spelling of alkynes was a huge problem and many candidates did not know much about the electrolytic cell and exothermic reactions.
<b>2. Why question was poorly answered:</b> Also provide specific examples: See part one question 2.
Candidates have to be more careful with their handwriting – sometimes the markers could not decipher the letters. Some candidates did not know the answer and left a space – they should, at least, guess the answer. Candidates who performed poorly did not know their work – it was a reasonably easy question. Candidates did not know the differences between molecules, atoms, ions, etc. Candidates should be taught the basics. Ensure that they know and understand the terminology used in the examination guideline. Having a detailed examination guideline makes not knowing all required terminology inexcusable.
<b>3. Provide suggestion for improvement in relation to the following :</b>
<b>(i) Learning and teaching</b>
Basic concepts and principles should be the first step in teaching. Emphasize the fact that this is the type of question where candidates can get full marks and that it is inexcusable not to know definitions. Candidates should make an effort to study and must be able manage rote learning. Teachers should give frequent class tests to ensure that candidates know their work.
<b>(ii) Support</b>
Candidates must have textbooks from which they can learn. Assistance and encouragement by teachers are crucial.
<b>4. Describe any observations relating to responses of candidates : e.g positive, negative, outstanding etc.</b>
Spelling of scientific terms remained a problem. Candidates should practise the correct spelling of specific terms. Teachers must be strict in marking throughout the year so as to ensure accuracy.
<b>5. Any other comments useful to teachers, subject advisors</b>
Learn the basics, starting in Grade 8. Science is a way of thinking and arguing that requires a lot of knowledge, and it takes years to grow and develop in the minds of candidates. Forget about crisis management for Grade 12s. Start with proper physics and chemistry in Grade 8.

<b>QUESTION 2</b>
<b>1. General comment on the performance of candidates. Was the question well answered or poorly answered?</b>
The multiple-choice questions were well answered by many candidates.
<b>2. Why question was poorly answered:</b> Also provide specific examples
Lack of knowledge and not enough experience in answering MCQs.
<b>3. Provide suggestion for improvement in relation to the following :</b>
<b>(i) Learning and teaching</b>
Candidates should be regularly exposed to MCQs in internal examinations. Teachers should use past question papers to set their tests and examination papers so that the candidates get used to the phrasing of typical questions and learn how to respond. Candidates should be careful with their handwriting – markers sometimes could not distinguish between B and D.
<b>(ii) Support</b>
Teachers should give frequent class tests and support and guide candidates in answering MCQs.

<b>4. Describe any observations relating to responses of candidates : e.g positive, negative, outstanding etc.</b>
Candidates did not read instructions carefully. They wrote down the complete answer instead of only the letter of the correct answer.
<b>5. Any other comments useful to teachers, subject advisors</b>
Supply candidates with many examples of MCQs covering the whole syllabus. Practice, practice, practice!

<b>QUESTION 3</b>
<b>1. General comment on the performance of candidates. Was the question well answered or poorly answered?</b>
This fairly easy question on organic chemistry can serve as an indicator of the performance of schools. Even less capable candidates should have scored in this question – if they had known the basics of organic chemistry.
<b>2. Why question was poorly answered:</b>
<p>This question tested candidates' knowledge and understanding of different organic functional groups and homologous series. The fact that many candidates performed poorly points to a lack of basic knowledge. The bad performance in Q3.1.2 and Q3.3, involving content not taught in the old syllabus (report 550), points to teachers struggling to manage the new FET content.</p> <ul style="list-style-type: none"> <li>Identifying functional groups – structural formulae. Candidates did not know the number of bonds for carbon, hydrogen &amp; oxygen. They did not know the difference between the terms structural formula and condensed/molecular formula.</li> <li>Incorrect number of bonds per atom (C: 5 bonds, H: 2, O....etc)</li> <li>Naming (IUPAC) of organic compounds was a problem. Hyphens were omitted, numbering was incorrect (not longest chain or nearest to functional group).</li> <li>Investigative question &amp; hypothesis</li> <li>There were problems with the relationship between physical properties &amp; intermolecular forces, the identification of variables and the relationship between them.</li> <li>Teachers are confused about which version of IUPAC-rules is used – some issues are not very clear (methylpropane vs 2-methylpropane)</li> <li>Organic chemistry is obviously poorly taught in many schools. Do teachers have the subject knowledge?</li> <li>The performance of candidates is school related.</li> <li>Confusion/ignorance regarding hydration, hydrolysis &amp; hydrogenation – many candidates did not have a clue. Poorly taught.</li> <li>Viscosity was very poorly taught.</li> </ul>
<b>3. Provide suggestion for improvement in relation to the following :</b>
<p><b>(i) Learning and teaching</b></p> <p>Teachers who do not have the necessary background should be assisted by well presented courses focusing on content. The courses presented at the introduction of the FET focused on methodology and other sideshows, but were very seriously lacking in what teachers really needed.</p> <p>Teachers should use past question papers to set their own papers so that candidates can be exposed to examples of how organic chemistry is examined.</p> <p>Teachers must assist candidates to make appropriate summaries.</p>
<b>(ii) Support</b>
See (i)
<b>4. Describe any observations relating to responses of candidates : e.g positive, negative, outstanding etc.</b>
Candidates struggled with the IUPAC naming of compounds and also with the drawing of structural formulae.
Candidates could not identify or draw functional groups correctly.
<b>5. Any other comments useful to teachers, subject advisors</b>
CAs should use the results in this question to ascertain which schools require training for their teachers.

<b>QUESTION 4</b>
<b>1. General comment on the performance of candidates. Was the question well answered or poorly answered?</b>
The question required data response skills and knowledge and was on a higher level than Q3. Some candidates who performed badly in other questions, obtained some marks here as they could answer the data response questions, although their chemistry knowledge was not enough to answer pure chemistry questions.
<b>2. Why question was poorly answered:</b> Also provide specific examples
Candidates should be taught how to formulate an investigative question, by identifying the variables and then asking what the relationship between them is. Then, if the question starts with "What is the relationship between ...", the candidate will probably get the correct answer.
<b>3. Provide suggestion for improvement in relation to the following :</b>
<b>(i) Learning and teaching</b>
Candidates should get used to arguing and drawing relationships between variables. Experience of practical laboratory experiments will be of great value in answering a question like this.
<b>5. Any other comments useful to teachers, subject advisors</b>
When candidates do practical work, or even engage with the experimental process without doing practical work, teachers should not think for them. They should be given the opportunity to engage in critical thinking.

<b>QUESTION 5</b>
<b>1. General comment on the performance of candidates. Was the question well answered or poorly answered?</b>
This question tested knowledge of organic chemical reactions. While it was probably one of the most difficult questions in the paper, there was nothing in it that an average candidate should not have been able to answer, as it directly tested content spelled out quite explicitly in the examination guideline.
<b>2. Why question was poorly answered:</b> Also provide specific examples
The reason for poor answering was simply a lack of preparation.
<b>5. Any other comments useful to teachers, subject advisors</b>
CAs should ensure that their teachers are properly trained to teach organic chemistry. If they don't, they are committing a crime against the candidates who become the victims of a dysfunctional system.

<b>QUESTION 6</b>
<b>1. General comment on the performance of candidates . Was the question well answered or poorly answered?</b>
Q6.1, on reaction dynamics, was also an indicator of candidates' basic knowledge. From the responses offered it was clear that many candidates simply did not have that basic knowledge. On the other hand, well prepared candidates had no problem. Q6.2 was much more difficult, and involved higher order skills. It was expected that weaker candidates would struggle more here.
<b>2. Why question was poorly answered:</b> Also provide specific examples
<ul style="list-style-type: none"> <li>• After 3 years of teaching the new curriculum, the candidates still struggle. They don't know how to answer investigative question, or formulate hypotheses and conclusions. They cannot identify variables and do not understand the relationship between independent and dependent variables – even candidates performing well, struggle with these.</li> <li>• Candidates cannot apply knowledge obtained from practical investigations to similar examples which are not done at school – they know only about specific experiments. Direct and inverse proportionality was still confusing to many candidates.</li> </ul>
<b>3. Provide suggestion for improvement in relation to the following :</b>
<b>(i) Learning and teaching</b>
Q6.2: Candidates should be taught how to formulate a hypothesis. The basic steps of identifying the variables and then stating the relationship between them, was clearly lacking even in the responses of candidates that performed well in other questions.

<b>(ii) Support</b>
Teachers are responsible for <b>TEACHING</b> and <b>SUPPORTING</b> candidates. Give frequent class tests and opportunities for candidates to practise answering specific types of question.
<b>4. Describe any observations relating to responses of candidates : e.g positive, negative, outstanding etc.</b>
It is obvious that many candidates cannot identify variables correctly and were not taught how to write an investigative question or hypothesis.
<b>5. Any other comments useful to teachers, subject advisors</b>
Do as many practical investigations as possible.

<b>QUESTION 7</b>
<b>1. General comment on the performance of candidates . Was the question well answered or poorly answered?</b>
This question consisted of very definite sub-questions: 7.1 was on the industrial processes. It was again clear that many candidates lacked the basic knowledge that should have been taught from Grade 10 onwards. 7.4 & 7.3 were on LO3. Candidates had problems formulating answers to these questions. 7.5 was on basic reaction dynamics. Many candidates struggled with this very straightforward question, probably because what it tested was not taught properly. What is worrying in this regard is that it is subject matter taught in Report 550, so teachers have no excuse. 7.6 was an equilibrium calculation that many candidates did not attempt, or started without going anywhere. This is a standard kind of problem, but the way that it was asked required candidates to display a high level of understanding.
<b>2. Why question was poorly answered: Also provide specific examples</b>
7.1 Because candidates did not know their work. 7.2 Because LO3 questions are very difficult to prepare for. 7.3 & 7.4 Because candidates did not know their work. 7.5 It was a higher order question.
<ul style="list-style-type: none"> <li>• LO3 questions should not be asked as they are almost impossible to mark and sometimes unfair to the candidates as there are many correct answers not in the memo. What exactly do we want to know from the candidates?</li> <li>• 2<sup>nd</sup> or 3<sup>rd</sup> Language candidates could not express themselves clearly in the LO3 questions.</li> <li>• Too many candidates were unable to write balanced chemical reaction equations – something that should be taught in Grades 8, 9, 10 &amp; 11!</li> <li>• Candidates were unable to write formulas and symbols! Basic chemistry.</li> <li>• The <math>K_c</math> expression is still a problem and many candidates had not been taught to write a relatively easy expression.</li> </ul> <p><math>K_c</math> calculation: Candidates either manage it or do not have a clue. The memo was very fair in the sense that the method and not values earned marks.</p>
<b>3. Provide suggestion for improvement in relation to the following :</b>
<b>(i) Learning and teaching</b>
Teach candidates basic chemistry! Writing of formulae, symbols and equations: Many candidates are still struggling with the balancing of chemical equations.
<b>(ii) Support</b>
<b>4. Describe any observations relating to responses of candidates : e.g positive, negative, outstanding etc.</b>
It is inexcusable that candidates cannot even write the expression for $K_c$ ! It appeared that basic chemical calculations (mole, concentration, etc) were not taught properly in Grades 10 & 11.
<b>5. Any other comments useful to teachers, subject advisors</b>
See comments in previous questions.

<b>QUESTION 8</b>
<b>1. General comment on the performance of candidates . Was the question well answered or poorly answered?</b>
It was clear that, just as some schools do not teach organics (Q3-5) properly, some schools do not teach electrochemistry (Q8-10) properly. While candidates from some centres did very well, others were at a complete loss. Of the electrochemistry questions, Q8 was the best answered, as most candidates managed to do the emf calculation. Q8.6 was a higher-order question and most candidates probably guessed the answer.
<b>2. Why question was poorly answered: Also provide specific examples</b>
<ul style="list-style-type: none"> <li>Redox reactions, cells and half reactions are still not taught well at many schools – the same type of questions are being asked every year and still the candidates cannot manage.</li> <li>Standard conditions of cells..... basic question... candidates did not have a clue.</li> <li>Half reactions can be copied from the data sheet, but candidates weren't taught how to do this.</li> <li>The formula to calculate <math>E_{\text{cell}}</math> was on the data sheet, but many candidates could not write it down correctly.</li> </ul>
<b>3. Provide suggestion for improvement in relation to the following :</b>
<b>(i) Learning and teaching</b>
If candidates are able to do the emf calculation, they should also be able to do the other sub-questions. When being taught, they should be challenged to solve more difficult problems, so that they will be prepared for the examination.
Please <b>TEACH</b> the candidates!
<b>(ii) Support</b>
Use frequent class tests. Expose the candidates to typical questions throughout the year.
<b>4. Describe any observations relating to responses of candidates : e.g positive, negative, outstanding etc.</b>
Careless responses by candidates – they should be told how to answer questions.
<b>5. Any other comments useful to teachers, subject advisors</b>
Be strict with your marking during the year. CAs should show teachers how scripts are being marked at the end of the year so as to ensure that candidates respond in ways that earn maximum marks.

<b>QUESTION 9</b>
<b>1. General comment on the performance of candidates . Was the question well answered or poorly answered?</b>
This question would not have been very difficult for candidates who had seen an electrolytic cell in the laboratory, and understood the process that takes place. It again boils down to proper teaching.
<b>2. Why question was poorly answered: Also provide specific examples</b>
The response to this question was disappointing, possibly because of a lack of proper teaching in the lower grades. Candidates should acquire principles and knowledge over the years. It was, for instance, required that candidates know the symbol for silver, something that they should have learned in earlier grades. <ul style="list-style-type: none"> <li>Candidates did not understand the difference between oxidation and reduction – and did not know when to put in the charge.</li> <li>Basic terms (electrolyte, salt, ions, symbol, formula) are not taught properly at many schools. Candidates could not write formulae correctly.</li> </ul>
<b>3. Provide suggestion for improvement in relation to the following :</b>
<b>(i) Learning and teaching</b>
Candidates should work through past question papers.
<b>(ii) Support</b>
Use frequent class tests.

<b>4. Describe any observations relating to responses of candidates : e.g positive, negative, outstanding etc.</b>
Poor understanding of how to write half reactions, charges and definitions of oxidation, etc
<b>5. Any other comments useful to teachers, subject advisors</b>
CAs must assist teachers to obtain past question papers. Make sure that all teachers have a clear understanding of the exam guidelines and a proper subject knowledge.

<b>QUESTION 10</b>
<b>1. General comment on the performance of candidates. Was the question well answered or poorly answered?</b>
Most candidates not could get the oxidation number (Q10.1) – knowledge that should have been carried from Grade 11. Many struggled with Q10.2 & 10.3, probably owing to a lack of knowledge. Q10.4 showed that a very large percentage of candidates had problems the moment that they are required to think outside the box. In Q10.6 an error resulted in 5 marks being awarded to all candidates.
<b>2. Why question was poorly answered:</b> Also provide specific examples
<ul style="list-style-type: none"> <li>• Candidates struggled with the oxidation number of lead.</li> <li>• They could not write a net cell reaction from half reactions.</li> </ul> The reducing agent and the explanation of the term were poorly answered. Batteries and battery capacity were poorly taught.
<b>3. Provide suggestion for improvement in relation to the following :</b>
<b>(i) Learning and teaching</b>
See comments in previous questions.
<b>(ii) Support</b>
See comments in previous questions.
<b>4. Describe any observations relating to responses of candidates : e.g positive, negative, outstanding etc.</b>
See comments in previous questions.
<b>5. Any other comments useful to teachers, subject advisors</b>
See comments in previous questions.

<b>CHIEF MARKER: (SIGNATURE)</b>
<b>M.E. DE VOS</b>
<b>HEAD OF EXAMINATION:</b>