



**EXAMINATIONS AND ASSESSMENT CHIEF DIRECTORATE**

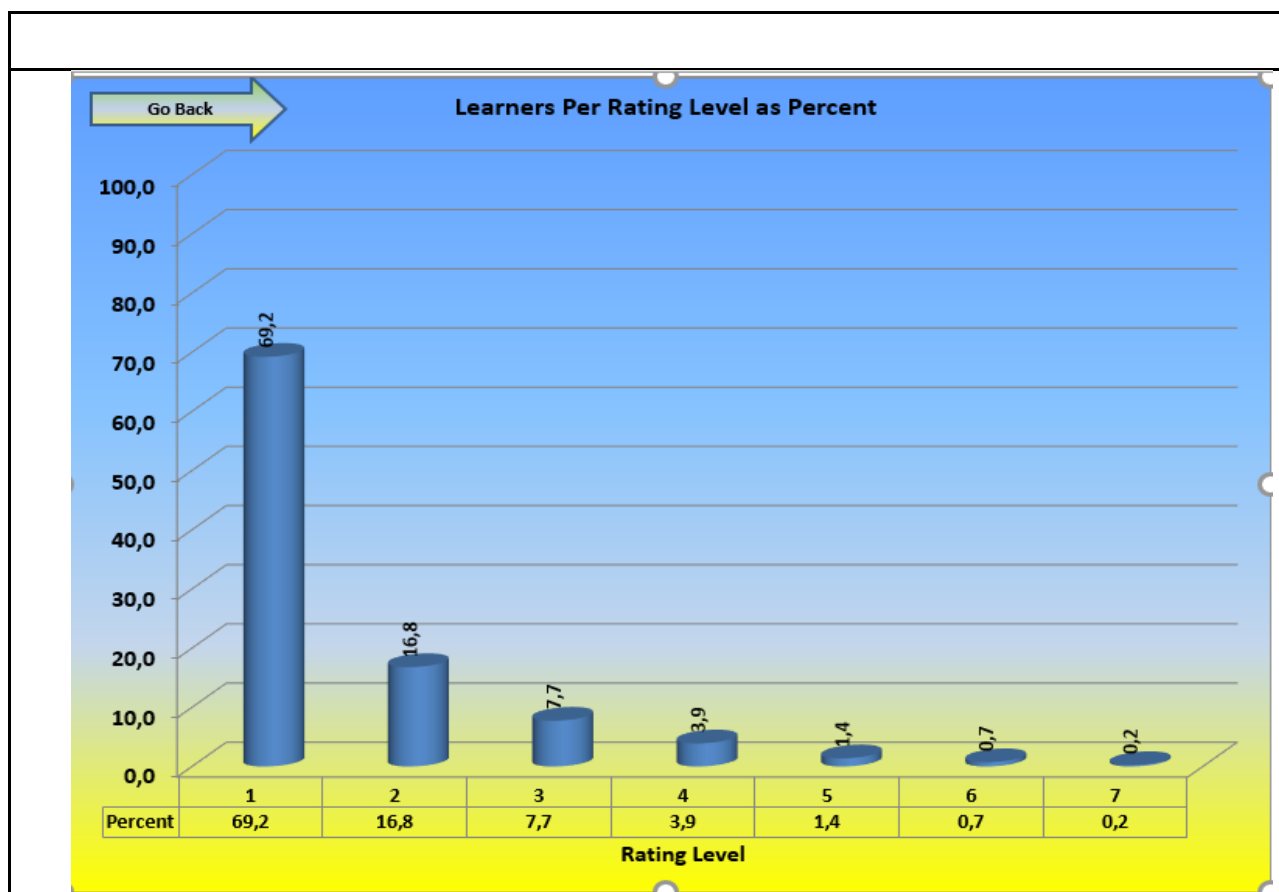
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## 2019 NSC CHIEF MARKER'S REPORT

SUBJECT:	TECHNICAL SCIENCES
PAPER:	2
DURATION OF PAPER:	3hrs
DATES OF MARKING:	1 – 14 DECEMBER 2019

**SECTION 1: (General overview of Learner Performance in the question paper as a whole)**

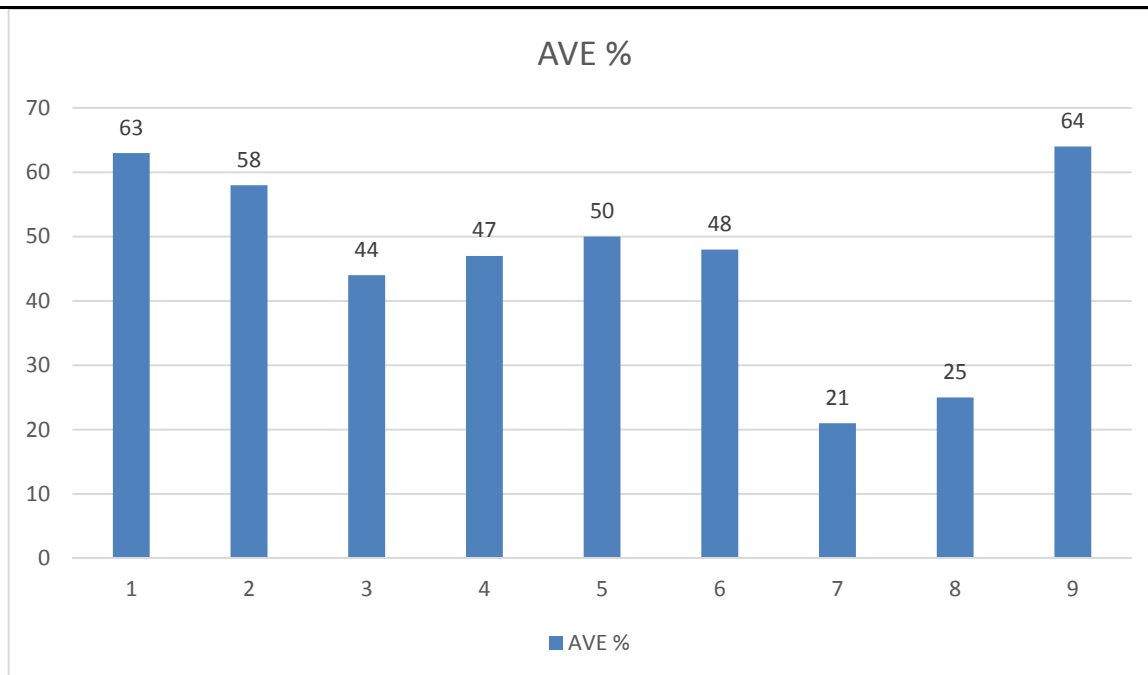


The learners performed poorly according to 7-point scale analysis as depicted by the graph above. A bulk of learners performed at level 1 at a percentage of 69% which led to an overall percentage of 38%. In level 2 performed with 16.8%, level 3 with 7.7, level 4 with 3.9%, level 5 with 1.4 level 6 with 0.7% and level 7 with 0.2%. Most learners scored low marks in individual questions which resulted to poor performance. Even though the paper was generally fair learners performed poorly irrespective of its fairness. The graph lies mostly to the left which clearly shows that most learners could not perform in the high range (level 5-7).



*Ikamva eliqaqambileyo!*

The graph below shows the analysis of learner performance as per 100 scripts that were sampled for Rasch report.



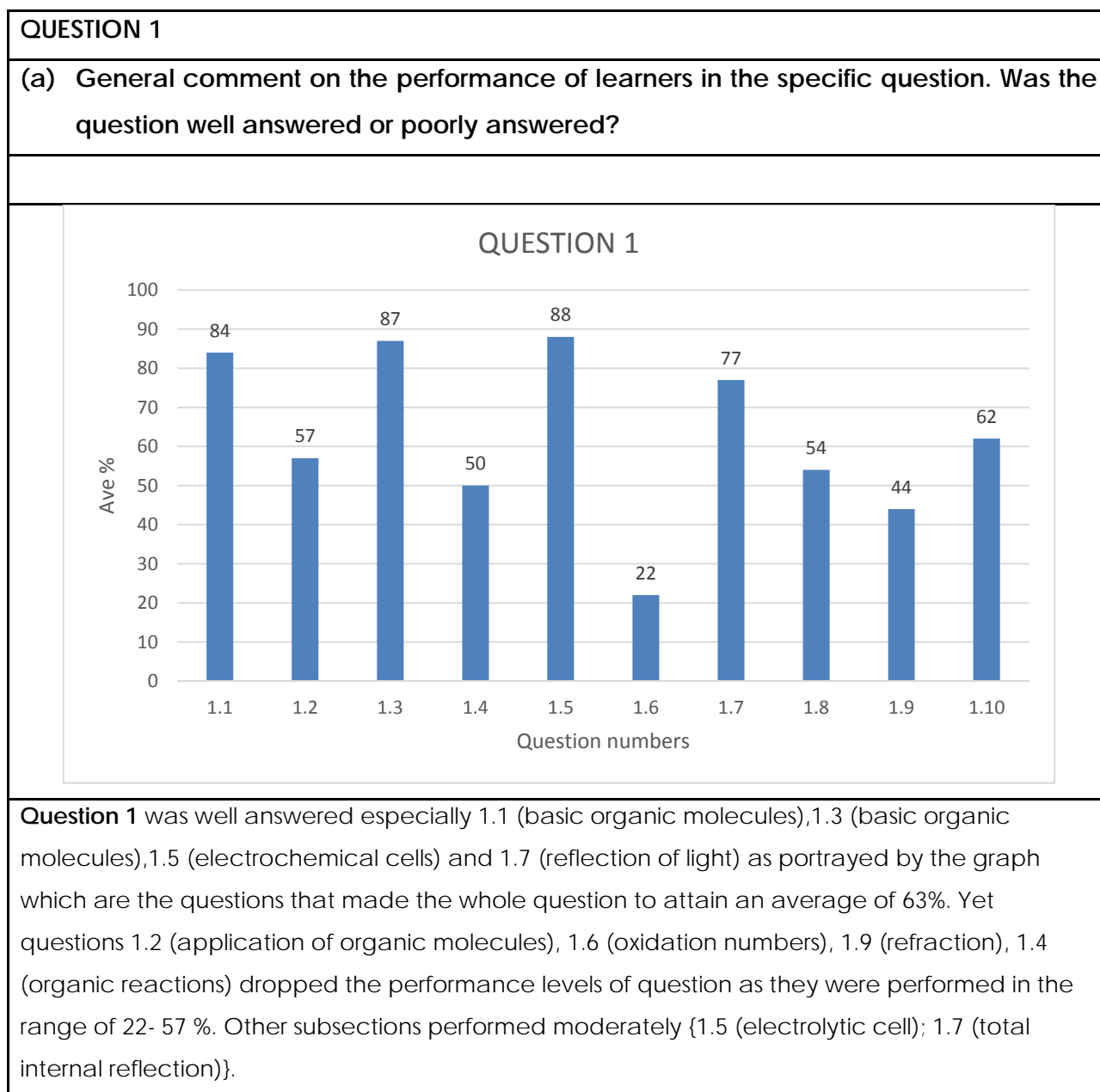
The learner performance is founded on the relative performance of sampled 100 scripts tabled and graphed below (see table 1 and figure 1). An overall performance of 42% was attained from the sample. The graph and table below indicate that the average learner performance ranges between 25 % and 62% from question 1 to question 9.

In accordance with the presented statistics, question 5 was the most poorly performed question followed by question 8. The most performed question was Multiple Choice questions which outlines **grade 12** Technical Sciences content; with an average performance of 62% which is not an outstanding performance. Questions 2 (**basic organic molecules**) and question 6 (**galvanic cell**) performed at 50% and 46% respectively. Question 3 (**Physical properties of organic molecules**), question 7 (**Reflection of light**), Question 9 (**Electromagnetic waves**) and question 4 (**Organic Reactions**) performed at a range of 41-46%. The most poorly performed questions were question 5 (**Electrolytic Cell**) and question 8 (**Refraction of light**) that achieved at 25% and 37% respectively.

## SECTION 2:

Comment on candidates' performance in individual questions

(It is expected that a comment will be provided for each question on a separate sheet).



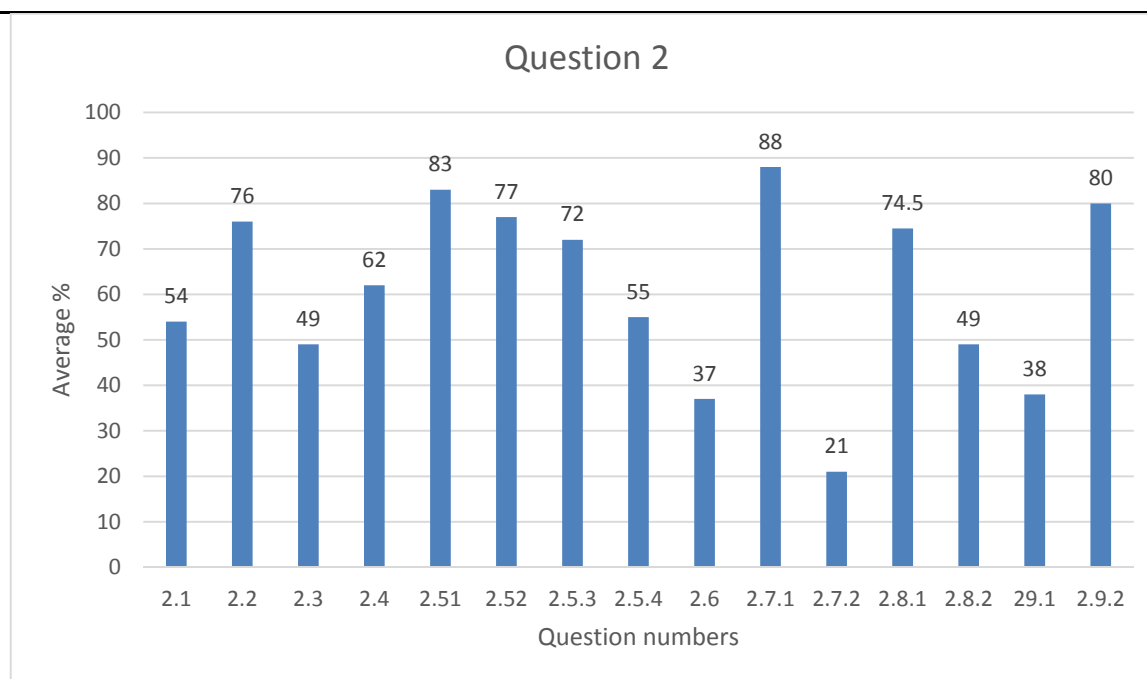
<b>(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.</b>
Question 1.4 specifically was poorly performed owing to insufficient information that was given in the statement. 1.6 was poorly answered because learners could not work out the oxidation number for chloride ion, seeing two atoms of chlorine in $\text{CuCl}_2$ learners concluded that the correct answer is -2.

<b>(c) Provide suggestions for improvement in relation to Teaching and Learning</b>
Oxidation numbers should be revised meticulously in grade 12 and taught thoroughly in grade 11. Language used in the paper should be simple and cater for learners from various backgrounds

<b>(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.</b>
1.9 also indicated that learners do not have deep understanding refraction of colors of spectrum

**QUESTION 2**

**(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?**



QUESTION 2 was moderately performed at an average of 58 %.

There were pockets of quality in this question as the level of performance was better in 2.51 (identification of homologous series); 2.7.1 (drawing structural hydrocarbon); 2.9.2 (application of Polyethene)

2.6, 2.7.2 and 2.9.1 were glaringly poorly performed. Summarily the question was not moderately performed at 58% which is less than the expected performance since the section is about basic organic molecules. A clear distinction between the structure of a compound and a structure of a function in each homologous series should be revised thoroughly

**(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.**

2.7.2 was poorly answered because learners confused the structure of the functional group with the structure of the ester that was in question. A clear distinction between the structure of a compound and a structure of a function in each homologous series should be revised thoroughly

**(c) Provide suggestions for improvement in relation to Teaching and Learning**

A clear distinction between the structure of a compound and a structure of functional group with the structure of ester that was in question.

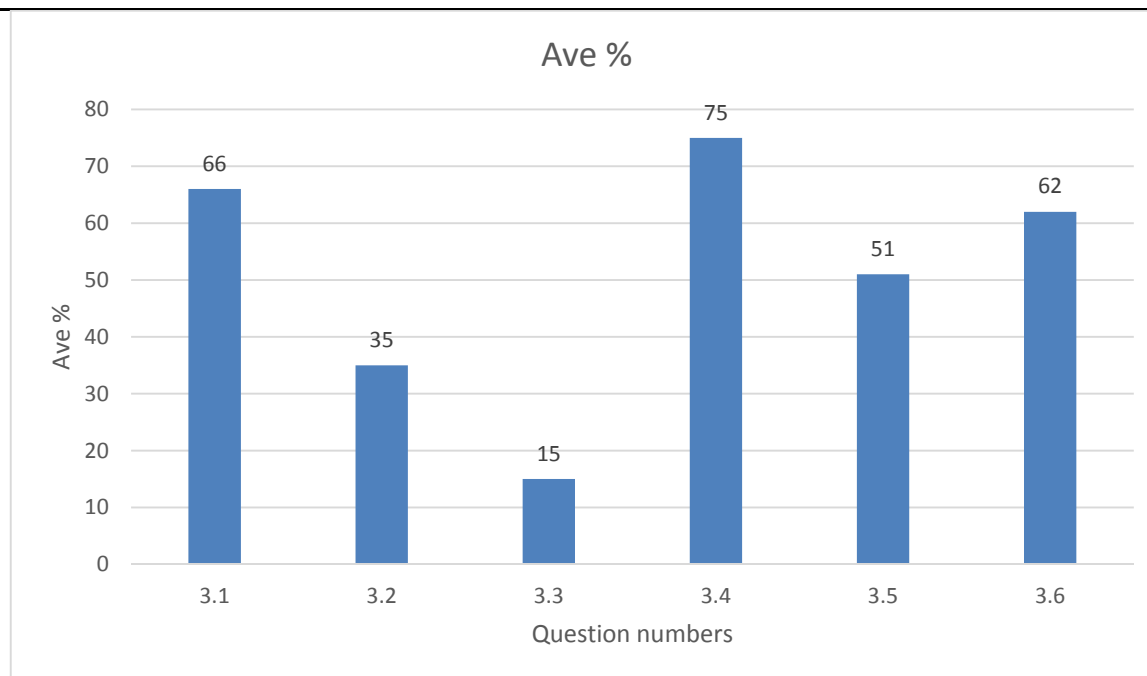
**(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development**

**etc.**

Learners used definitions from the text books instead of using the policy document and examination guide lines. Learners could not distinguish between saturated and unsaturated hydrocarbons. 99 % of responses were omitting the word " only" in the definition of saturated compounds

### QUESTION 3

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



Question 3 was performed at 44 % on average and has improved by 1 % compared to 2018 where it was 43%. Questions 3.2 (explanation for the difference in boiling points), 3.3 (definition of the melting point) were poorly performed.

(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Learners could not define the boiling point as per examination guidelines they were explaining from text book or from their own understanding. Learners could not give proper explanations in the trends in boiling points with comparison to chain length.

(c) Provide suggestions for improvement in relation to Teaching and Learning

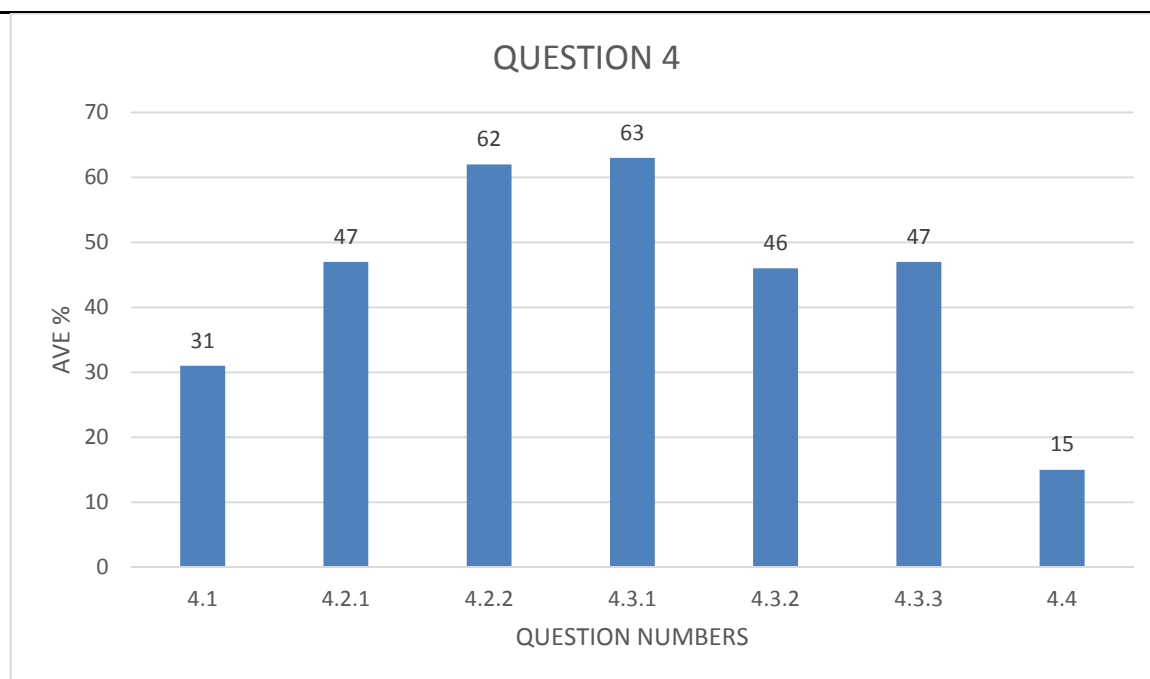
Definitions should be given as per examination guidelines- It should be mandatory that all learners are provided with copies of examination guidelines at the beginning of the year.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Questions that need **explanations** should be included in **informal tasks**. Learner should be trained on writing the phrase "to **overcome intermolecular forces**" not to break the bonds when explaining the trends of physical properties. When comparing two compounds, learners should be taught to **mention both** compounds and not be too general but be **specific to the given compounds**.

#### QUESTION 4

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



This question was answered at an achievement of 36 % in 2018 and improved to 44% even though it is not a good performance. Questions 4.1 (identification of combustion reaction), 4.4. (reaction conditions) were noticeably underperformed which dragged the performance in question 4. Organic reactions generally are still a challenge to learners they cannot interpret the flow diagram.

(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Candidates underperformed in question 4.4 due to omission of **"mild"** before heat and **"dilute"** before strong base. Application of butane as a fuel was not properly interpreted by learners hence the underperformance in 4.1.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Interpretation of flow diagrams and understanding of reaction conditions should be the integral part in the teaching of organic reactions and should be assessed in all assessment tasks, both formal and informal

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

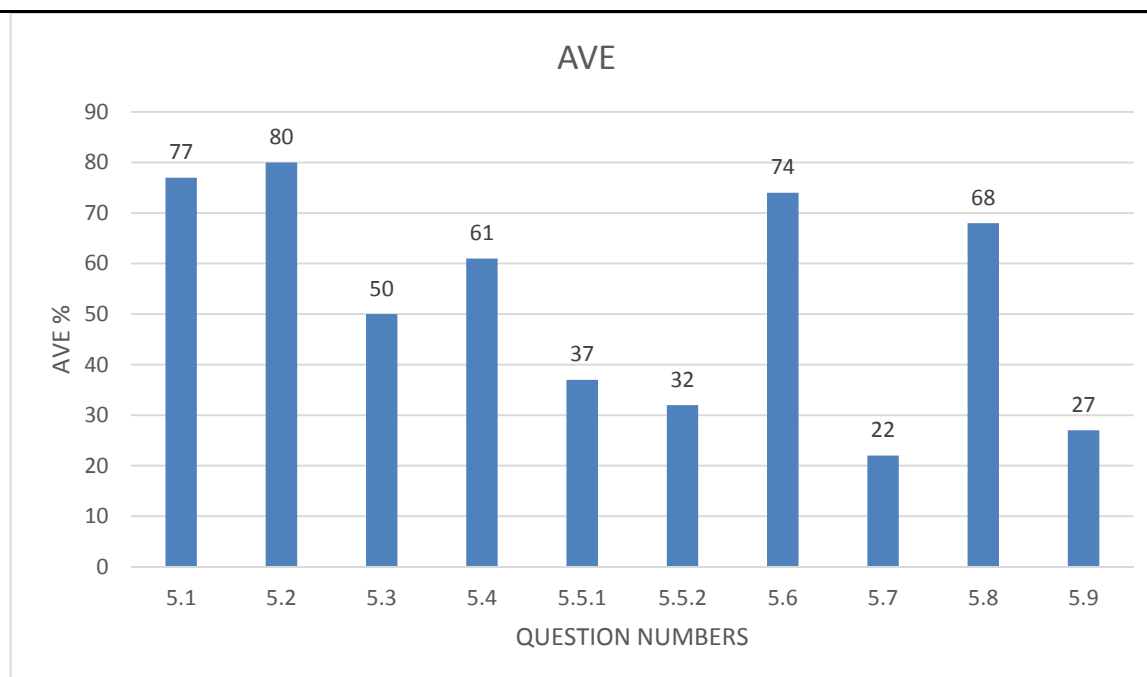
The only types of reactions as depicted by learner responses are substitution and addition reaction. Emphasis should be done in all types of reactions Combustion, substitution and



addition reactions. Clear differentiation between these types of reactions should be done properly. A series of practice exercises should be given to learners where learners are taught to identify the **starting point (e.g. structure of but-2-ene in 4.2) in the flow diagram**, on which all other reactions depend.

**QUESTION 5**

**(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?**



Question 5 is the most improved question in comparison with 2018 where it performed at 25% , the section improved to 50% which is 50% improvement. The sub-questions that dropped the performance in question 5 were: 5.7(identification of reducing agent), 5.9(overall net reaction) and 5.5.2 (balanced reaction at the anode).

**(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.**

In 5.5.2 learners could not write the oxidation half reaction correctly and they were working with double arrows which made them to lose marks.

**(c) Provide suggestions for improvement in relation to Teaching and Learning**

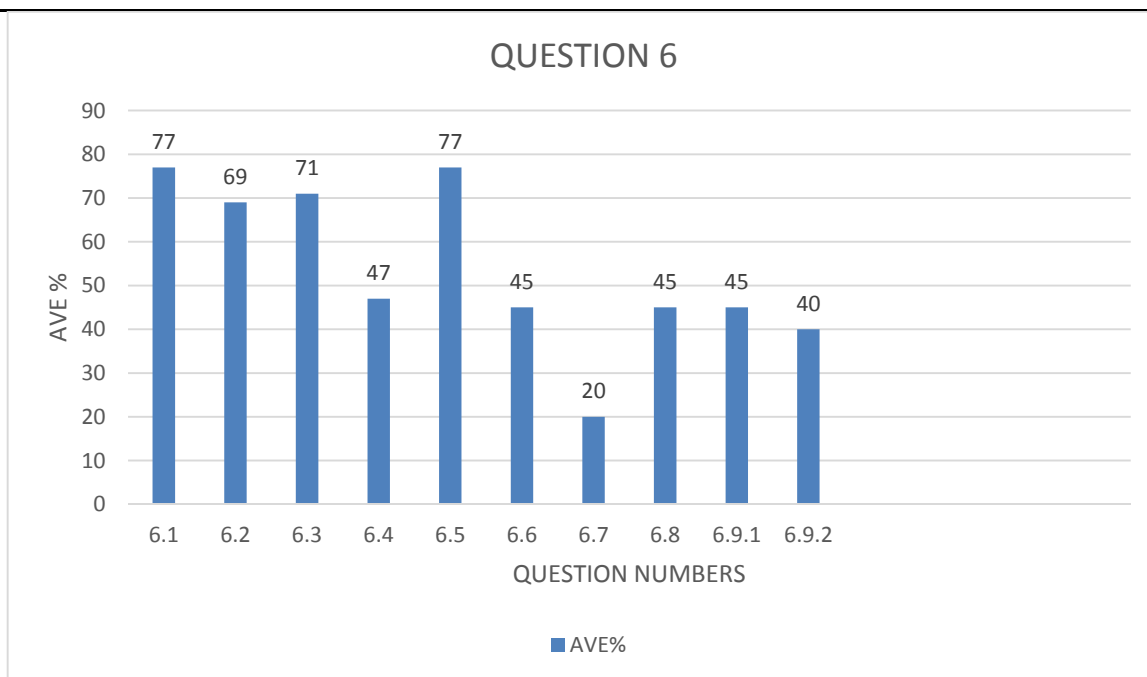
Learners must be taught to identify the anode and cathode and how to write half reactions. Ions and their symbols should be practiced. Clear differentiation between net reaction and scientific notation should be made.

**(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.**

Energy conversions were a challenge, learners confused the energy change of an electrochemical cell to that of galvanic cell. Charges on  $e^-$ ,  $Cu^{2+}$  and  $Cl^-$  were omitted which made most learners to lose marks.

## QUESTION 6

(d) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



The overall performance of the question is 50%.

(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

The average performance of 6.4 is 47%. Learners struggled to give the functions of the salt bridge correctly. They used terms that ended up changing the whole statement. e.g. when they talk about the movement of "ions", instead they talk about the movement of electrons. In 6.6 the average performance is 45%. Learners struggled to explain why the mass of magnesium decreases. 6.7 is the least performed in question 6. Learners could not write the balanced net reaction, instead they wrote the cell notation of the cell. In 6.8 they performed poorly at an average of 45%. Learners could not identify the anode and cathode. The question was confusing the learners as there were many substances used. 6.9.1 is at an average of 45%, the topic might have not been revised well. Learners should have scored high marks in the question. In 6.9.2 the average performance is 40%. It was not a difficult topic, learners struggled to recall.

(c) Provide suggestions for improvement in relation to Teaching and Learning

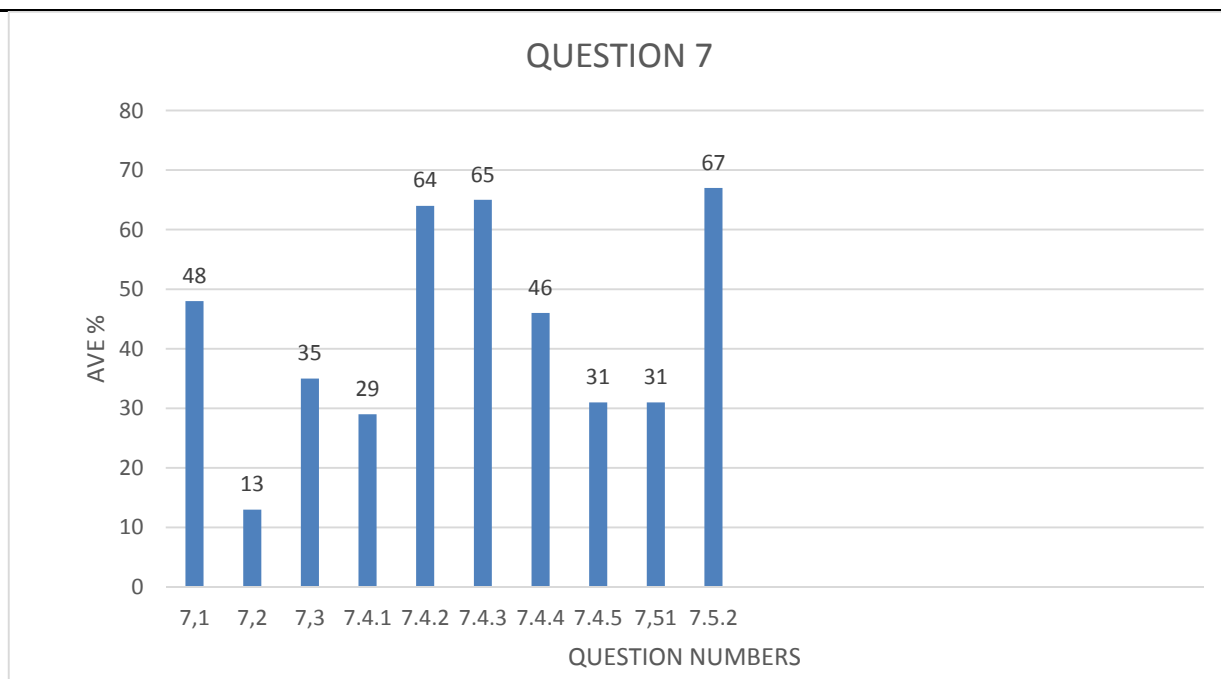
Learners must be properly taught the functions of the salt bridge as they appear on the examination guideline. They must be given more exercises on identifying the anode and cathode as well as calculating the emf of the cell. They must also be trained on how to use the standard reduction potential tables. They must be trained to write the correct balanced net reaction of the cell.

**(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.**

Learners must be thoroughly taught and need to have a physical science back ground.  
And learners who doing technical science they don't have science back ground.

## QUESTION 7

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



The learner performance for 2019 in the topic of light has dropped to 21% which is a poor performance.

(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

In 7.1 learners struggled to state the law of reflection. Question 7.2 is the worst performed with an average of only 13%. Learners seem to not understand the principle of reflection.

In 7.3 learners scored low marks due to incorrect labelling. Most of them were confusing the rays of light the angles. Some did not include the magnitudes of the angles as per instruction in the question paper. Direction of the rays was also not included by most learners.

In 7.4 the learners poorly performed with an average of 29%. They were not able to give a correct definition of the critical angle. In 7.4.4 the average percentage is 46% which is also below 50%. Most learners seem to not know the total internal reflection concept. The average performance in 7.4.5 is 31%. Learners were not able to define the total internal reflection as they did not get it right in 7.4.4. In 7.5.1 the average performance is 31% which is also low. Learners do not know the type of image formed when an object standing in front of a mirror.

(c) Provide suggestions for improvement in relation to Teaching and Learning

There is a high possibility of content gap in this topic. Teachers must do a thorough preparation before going to class. Examination guidelines must be used upon preparations.

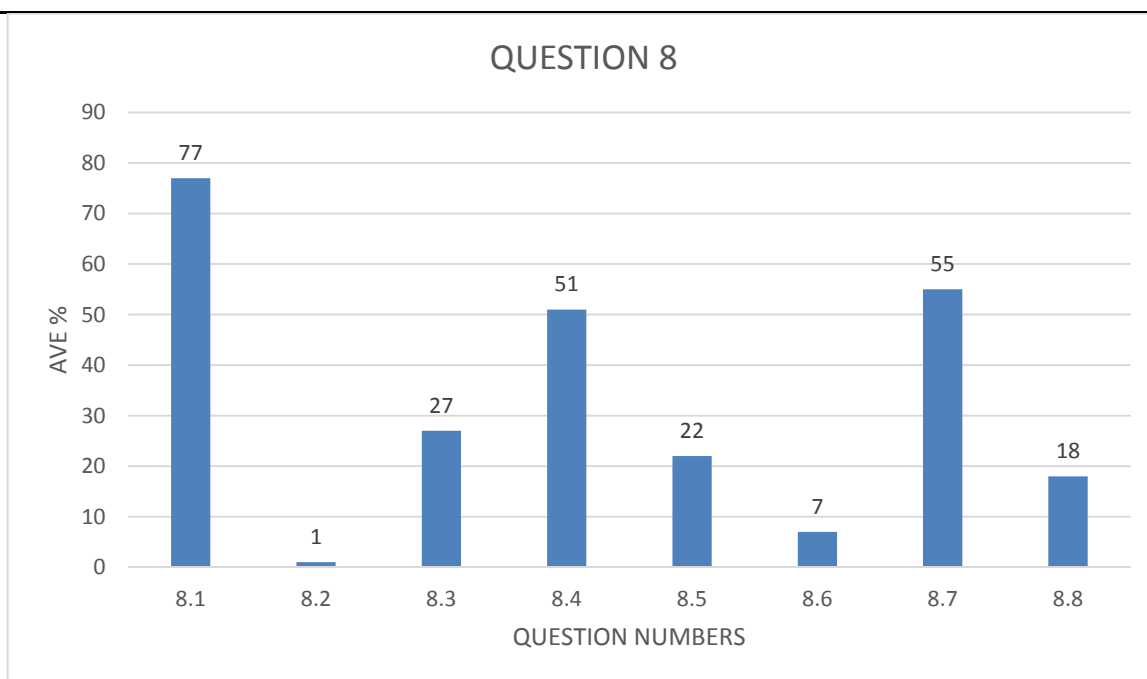
Practical demonstrations can also help when teaching this topic. Teachers must also use simulations for a better understanding of the topic.

**(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.**

Even though the learner performance is above 50% in other sub questions, learners could have easily scored high marks in question 7 as it is not a difficult topic. Subject advisors must assist teachers with small workshops within the districts. Team teaching can also assist.

## QUESTION 8

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



2019 question 8 performance has dropped to 25% from 295 in 28%. This shows that learners have poorly performed in this question.

(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

In 8.1 the average performance is 77% which is the highest compared to other sub questions. Most learners got a full mark in the question. 8.2 was the worst performed with an average of 1%. The term “attributes” disadvantaged the learners who are English second language. 8.3 was poorly performed with an average of 27%. This shows that not too much attention was given to the topic as it is a small topic. 8.4 was fairly performed with an average of 51%. Just below half of the candidates were not able to identify which photons of light have high energy. In 8.5 the average performance is 22% which shows that even those who were able to get a correct answer in 8.4, they were still not able to explain it. In 8.6 the average performance is 7% which is also the worst performed question. Learners cannot differentiate between convex and concave lenses. They might also be a content gap from the teacher’s side. In 8.7 just over 50% of learners managed to get the answer correctly. However, 45% of them did not get it correctly, it still goes back to the content gap as the question in lenses was poorly performed even in the previous year. In 8.8 learners performed poorly with an average of 18%, which the question is still in lenses.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Teachers must teach the topic of dispersion thoroughly as it still weighs marks even though it is a

small topic. Team teaching can also help as the performance in lenses is very low. District workshops are also needed to close the content gap in the topic.

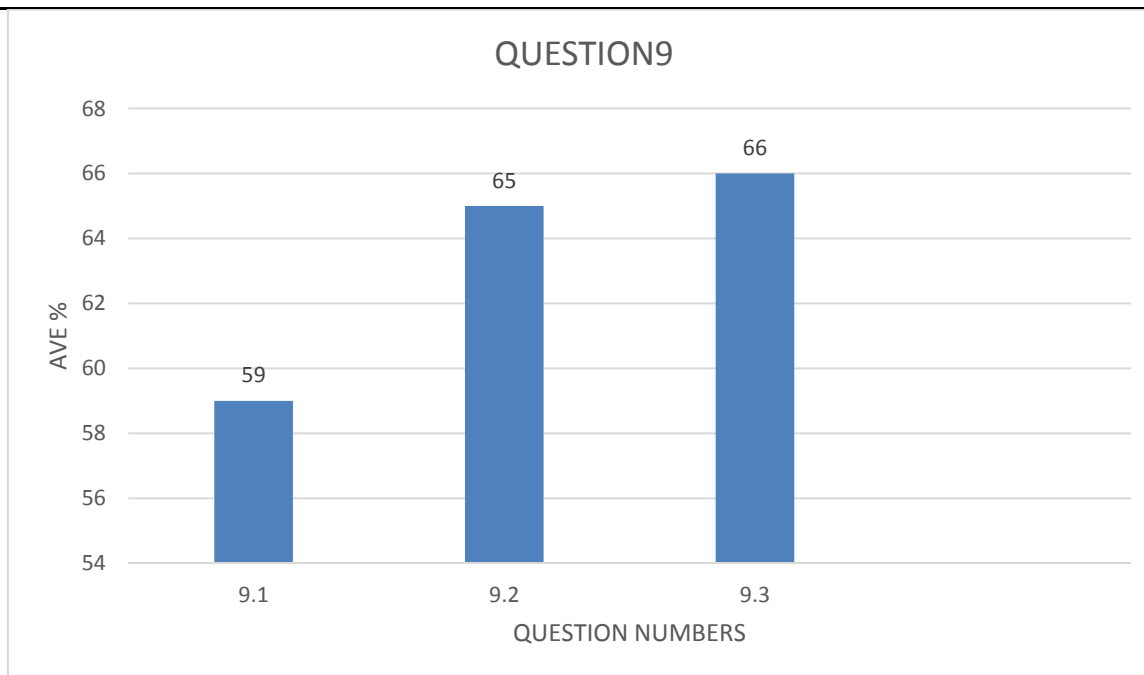
**(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.**

The poor performance in the question shows that there is content gap. Subject advisors must follow up with the teachers to find out the underlying problem.



## QUESTION 9

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?



The performance in this question has improved compared to 2018 performance which was 38% and 2019 is 64%.

(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

9.1 which is a definition of a photon, there is an average performance of 59%. Learners were able to give the definition as given in the examination guideline even though it is the least performed sub question in question 9 as a whole. In 9.2 the average performance is 65% which is a fair performance even though learners could have scored full marks. The rural arear learners were disadvantaged in picture C as most of them had no idea what a tanning sunbed is. Some learners could not link the pictures with the types of electromagnetic waves that is applicable to the functions of the electromagnetic waves. 9.3 is better performed than the other two sub questions. Learners did score full marks in the calculation as some of them could not convert nanometer. Some learners used an incorrect SI unit in the final answer.

(c) Provide suggestions for improvement in relation to Teaching and Learning

Teachers must use examination guidelines for a correct definition of a photon. Teachers must give more examples on the uses of types of electromagnetic waves. More focus must be given on the conversion between units as the topic starts in grade10. Use of correct SI units must be emphasized when teaching calculations.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

In general, the topic is not a difficult topic. Teachers are encouraged to also do internet research on the topic as a whole.