Let the mind manage the body
Que l'esprit gère le corps

MAURITIUS EXAMINATIONS SYNDICATE

NCE 2021-2022

GRADE 9

SCIENCE (Chemistry)

Subject code: N530

EXAMINERS' REPORT

July 2023

INTRODUCTION

The Nine Year Basic Continuous Education (NYBCE) includes two national assessments namely Primary School Achievement Certificate (PSAC), which is the first assessment at the end of the primary cycle and the National Certificate of Education (NCE), the second assessment which is taken at the end of Grade 9. The first cohort of candidates of Grade 9 sat for the NCE assessment 2021-2022.

The NCE assessment in Science is in line with the philosophy adopted in the National Curriculum Framework (NCF) and detailed in the Teaching and Learning Syllabus (TLS). The Science paper is assessed in three separate papers namely Biology, Chemistry and Physics. Each paper is based on the three assessment objectives as depicted in **Table 1**.

Table 1: Assessment Objectives

	Assessment Objective	**Weighting**
AO1	Knowledge with understanding	45 – 50
AO2	Application	25 - 35
AO3	Scientific Inquiry	20 - 25

NCE assessment for Chemistry for the year 2021 was based on a 'deloaded' specification where significant part of the unit 'Salt' was not assessed. For the 2021-2022, there has been no deloading and the examination covered the whole syllabus.

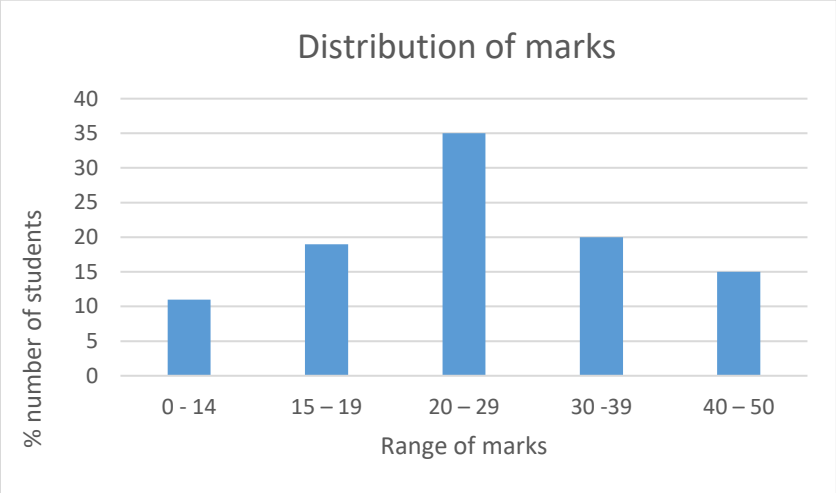
The examiners' report for the Chemistry component of the Science assessment offers a constructive feedback on candidates' performance and guidance for future candidates. The contents of the syllabus that gave rise to misconceptions are included in the report, which also highlights gaps in the conceptual understanding of candidates. Other aspects which caused difficulty, along with possible reasons, are also commented on.

This report should be read in conjunction with the question paper for the examination.

General comments:

The performance of students in the Chemistry paper was generally satisfactory. The paper was within the reach of most candidates with multiple choice questions, questions on labelling, matching, classification exercises and very few open-ended questions. However, it was observed that the major challenge remained writing of formulae and balancing of chemical equations.

The graph below shows the mark distribution in the Chemistry component.



QUESTION 1

It consisted of 10 multiple choice questions which many students correctly attempted. **Questions 1**, **2** and **3** had a very high facility index. **Questions 4, 5, 6** and **9** proved to be more challenging to candidates. Table 2 below provides the correct answer and the most incorrect answer for each item.

Table 2

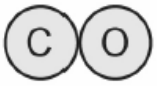
Item	Correct answer	Most Incorrect answer
1	C	D
2	D	A
3	B	A
4	D	C
5	B	C
6	B	A
7	A	B
8	A	C
9	C	D
10	D	B

Comments on individual questions:

4. Which of the following represents a carbon dioxide molecule?

A

B



C

D

For **item 4**, candidates understood that distractors A and B cannot be the answer as the molecule needs to include both carbon and oxygen. Whilst many candidates understood that D was the correct answer, some could not relate the diagram to the word ‘dioxide’ indicating that there need to be two oxygen atoms.

5. What is the formula of iron (II) chloride?

A $FeCl$

B $FeCl_2$

C Fe_2Cl

D Fe_2Cl_2

Item 5 proved to be challenging to many candidates. This item reveals that the confusion is about where to use variable valency to construct formula. The most common incorrect answer was C.

6. Which chemical equation is balanced?

A $H_2 + Cl_2 \longrightarrow HCl$

B $H_2 + Cl_2 \longrightarrow 2HCl$

C $H_2 + Cl_2 \longrightarrow 3HCl$

D $H_2 + Cl_2 \longrightarrow 4HCl$

Although **item 6** was about identification of a balanced equation, many struggled to get the correct answer, B.

9. Which salt is **insoluble** in water?

A Barium nitrate

B Potassium carbonate

C Silver chloride

D Zinc sulfate

Item 9 was a knowledge question that assessed candidates' knowledge of solubility of salts. Many failed to get the correct answer showing that more focus needs to be given on recall of solubility table.

Question 2

This question was based on the chapter Atmosphere and Environment.

(a) Some candidates were unable to match the air pollutants to their corresponding source of pollution. Nitrogen dioxide was often matched to the distractor 'oil spills' and methane to 'incomplete combustion of fuel' while carbon monoxide to 'decay of vegetation and animals'.

(b) (i) Many candidates answered correctly this part, giving methane as the common correct answer. Water vapour and CFCs were acceptable correct answers. However, some candidates mentioned carbon dioxide showing that they did not read the question properly. Carbon monoxide, oxygen and nitrogen were common mistakes.

(b) (ii) Being an open-ended question, many candidates did not score full marks for this part on consequences of global warming. Depletion of ozone layer, pollution and rise in Earth's average temperature were common incorrect answers. Candidates could not differentiate between the terms 'causes' and 'consequences'. Cyclones and droughts are naturally occurring natural calamities. The consequence of global warming impacts on the frequency or intensity of these natural calamities. It was important that candidates mentioned about the frequency/ intensity of natural calamities to score full marks. Telescoping of answers such as 'rise in sea level and submerge of small islands' was observed.

(c) Candidates were expected to give one harmful effect of acid rain on the environment and many scored one mark for making reference to the death of aquatic animals or making the soil acidic and hence kills plants as well as corrosion of statues and buildings. However, some candidates showed confusion between effect of acid rain and eutrophication. Skin problems and soil erosion were other common errors. Students should also be more descriptive in their answer, stating how acid rain affects plants or buildings and statues.

Question 3

This question was based on the chapter separation techniques and was generally well answered by most candidates.

(a) Candidates were expected to label the figure by filling in the empty boxes with appropriate words given in the list. Thermometer and bunsen burner were correctly labelled by most candidates. A good number of candidates could not differentiate between the distillation flask and the conical flask. It was clear to many that the pure liquid obtained during distillation is the distillate.

(b) Many candidates failed to indicate where water enters the condenser using an arrow. Some students left this part unanswered or others gave 2 arrows or showed a pathway for the flow of water inside the condenser.

(c) The matching exercise on separation technique was correctly done by most students, however some had interchanged sublimation and crystallization. The diagram for sublimation was also matched to chromatography by some candidates.

(d) Filtration was identified as a common correct answer for the separation of sand and water while sublimation was correctly identified for the separation of iodine and sand. However, filtration and crystallization were also suggested techniques to separate a mixture of iodine and sand, which did not score marks.

Question 4

This question focused on the unit 'Language of Chemistry'.

(a) Most students had been able to identify Ca and Pb as symbol for elements and have been able to recognise H_2SO_4 and K_2O as formula of compounds. However, classification of CO was found to be challenging. Many candidates mistook CO as Co (cobalt) and wrote it under the symbol column. It is very important that students understand that the first letter is a capital letter and the second letter is always a small letter when writing the symbol of an element. It has also been noted

that some students showed that they did not understand the word 'classify' as they listed the name of elements instead.

(a) Classify the following as symbols or formulae:

H_2SO_4 Pb Ca CO K_2O

Symbol	Formula

(b) Students were expected to write the name of the two elements which form the compound with formula NaBr. Sodium was correctly identified though some gave nitrogen, while bromide and barium were common incorrect answers for bromine. It was also been noted that some students gave sodium bromine. It is worth pointing out that students should pay particular attention while reading instructions so that they respond to the questions correctly.

(c) This item posed much difficulty for a good majority of candidates. Common mistakes included wrong valencies of elements and radicals. The proper use of capital and small letters in writing symbol and formula was evident from this question. The absence of brackets in writing formula involving radical was another common mistake. Some examples of incorrectly written formulae are $CaOH_2$, $Al_2(So_4)_3$, $AL(SO_4)_3$.

(d) Many candidates could not fill in both boxes with the integer 2 to balance the chemical equation, thus indicating that students have difficulty in balancing the number of atoms of each element on both sides of the equation. A few students have instead written symbols of elements in the boxes while some candidates did not attempt balancing the equation.

Question 5

This question was on the unit 'Metal and the Reactivity series' focussing on the burning of magnesium, neutralisation and displacement reactions. This was the most challenging question in the paper. Low ability candidates did not attempt this question.

(a) (i) Many candidates correctly stated the white (dazzling) flame when magnesium burns in oxygen. However, some students lost marks for giving two different colours such as silver and white or just specifying shiny or bright flame.

(a) (ii) This question was about the safety precaution to be taken when magnesium is burnt. Many candidates gave general laboratory precautions such as wearing of gloves, lab coat and mask which were not awarded marks. Students were expected to give one precaution related to the burning of magnesium ribbon. Wearing googles or not looking at the flame directly or for a long period of time were acceptable answers that were awarded marks.

(b) (i) Candidates could generally recognize the reaction between magnesium oxide and hydrochloric acid as the neutralisation reaction, although some confused with the displacement reaction. Chemical reaction was a common mistake.

(b) (ii) For the word equation, many pupils gave hydrogen or oxygen or hydroxide instead of water as a product. Some did not specify magnesium chloride and wrote salt + water as products. It has been noted that some students wrote = instead of an arrow and some wrote the chemical equation instead of word equation.

(c) (i) Many candidates were awarded marks for identifying metal X as iron or lead. Some candidates mentioned tin, nickel, chromium and cobalt and they were awarded marks as these metals are found between zinc and copper in the reactivity series. Sodium, calcium, silver and iodine were common incorrect answers.

(c) (ii) Most students could correctly tick the boxes to illustrate no reaction between X and magnesium sulfate solution and reaction occurs between Zinc and copper (II) sulfate solution. This showed that they could identify displacement reaction.

(d) (i) Some candidates wrongly wrote the balanced chemical equation between magnesium and copper(II) sulfate, giving Mg_2 or Cu_2 and Cu_2SO_4. Some gave the word equation.

(d) (ii) Many pupils explained about the displacement reaction instead of stating the observations made during the reaction. They stated that copper is formed since copper is less reactive than magnesium. Many candidates also gave incomplete answers such as deposits of copper formed or a colour change is seen. Many did not specify the colour observations.