UNIVERSITY OF SWAZILAND

FACULTY OF EDUCATION

SUPPLEMENTARY EXAMINATION PAPER

JULY 2016

B. Ed. II /PGCE

Course Code/Title of paper: EDC279 Curriculum Studies: Chemistry
CTE529 Curriculum Studies in Chemistry I

Time allowed: 3 hours

Instructions:

1. This paper contains FIVE questions.
2. Question 1 is COMPULSORY. You may then choose and answer ANY THREE questions from Questions 2, 3, 4, 5.
3. Marks for each question and sub-question are indicated at the end of the question.
4. Any piece of material or work which is not intended for marking purposes should be clearly CROSSED OUT.
5. Ensure that responses to questions are NUMBERED CORRECTLY.

Special Requirements

Information sheet attached: Why is there energy transfer?

THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR

QUESTION 1

a) A Chemistry teacher stated the learning outcomes given below for a 60-minute lesson on content from the SGCSE Physical Science syllabus topic: ***C6.0 Stoichiometry.***

At the end of the lesson, learners will:

i) use the symbols of the elements and write the formulae of simple compounds found in the syllabus

ii) deduce formulae of ionic compounds from given ions

iii) construct symbol and word equations, and simple balanced chemical equations

i) Critique these three learning outcomes. [7]

ii) Reconstruct the outcome(s), where necessary, so that they are stated according to accepted criteria. [8]

b) What important functions can the following serve?

i) Introduction to a lesson and [5]

ii) Conclusion of a lesson. [5]

QUESTION 2

Teaching science requires that teachers teach learners scientific knowledge, processes of science and scientific attitudes.

a) Why is it important that teachers attend to the underlined concepts when teaching learners science? [7]

b) Using Chemistry as a context discuss the role of practical work in learners development of the underlined characteristics of science? [18]

QUESTION 3

Suppose you plan to use **practical work** and the **question and answer** methods to teach your Form 4 class content from the syllabus sub-topic **C11.2 Reactivity series** in order to address learners' ability to:

> *- place in order of reactivity aluminium, copper, (hydrogen), iron, magnesium, potassium, sodium, zinc and gold by reference to their reactions, if any, with aqueous ions of other metals, reactions with water, steam and dilute hydrochloric acid.*

a) Describe the two methods noted above, and justify, their appropriateness for teaching the said content. [8]

b) Outline activities you might engage your learners in in order for them to attain the stated learning outcome. [17]

QUESTION 4

Suppose you gave learners in your class the attached passage on "**Why is there energy transfer?**" to read for homework.

a) Identify and state **five** examples of **scientific knowledge** learners might learn from reading the passage? [10]

b) (i) Construct items/questions for a test *(no need for specification table)* worth 10 marks, that you could use to assess learners understanding of the homework task. [8]

(ii) Construct a marking guide for the test constructed for b)(i) above. [7]

QUESTION 5

a) It is advisable for Chemistry teachers to prepare items simultaneously as the marking guides, when setting tests or examinations for assessing learners' abilities after instruction.

Discuss the importance of following the advice stated above in assessment of learning in Chemistry. [8]

b) "Construct related validity" is an important concept in assessment.

Discuss how the Examinations Council of Swaziland maximise the attainment of construct related validity in the SGCSE Physical Science examinations? [8]

c) Discuss the value of teaching practice in the training of a chemistry teacher. [9]

Why is there energy transfer?

Energy changes are a result of the rearrangements of particles (atoms, ions) in the reacting molecules as product molecules form. For a reaction to take place first bonds in reacting molecules have to be broken up. The atoms thereafter rearrange and form new bonds in products.

For example: $2H_2(g) + O_2(g) \text{ ---> } 2\ H_2O(g)$ (net energy loss)

You have studied the different types of bonds and their relative strengths in the chapter on chemical bonding. The strengths of bonds which are broken and those that are formed when chemical reactions occur will determine whether a reaction is endothermic or exothermic.

Let us exemplify what we have said by looking at the diagram below which shows the energy changes that take place in the formation of water from its elements. The two processes, bond breaking and bond forming, can clearly be distinguished.

You should notice that the atoms of hydrogen and atoms of oxygen have a higher energy content than the hydrogen and oxygen molecules. Energy is absorbed to break the bonds in the molecules (the H-H and O=O bonds). Thus bond breaking is an endothermic process. When the water molecules form (H-O-H bonds) a large amount of energy is released. Bond formation is an exothermic process. For this reaction there is less energy required to break up the bonds than that released when the new bonds are formed. The energy content of the resultant water molecules is less than the energy content of the original hydrogen and oxygen molecules and the reaction is therefore said to be exothermic.