UNIVERSITY OF SWAZILAND

FACULTY OF EDUCATION

MAIN EXAMINATION PAPER

B.Ed. II/PGCE

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Course Code/Title of paper:	CTE229	Curriculum Studies in Chemistry I
	CTE529	Curriculum Studies in Chemistry I
	EDC279	Curriculum Studies: Chemistry

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 Two pages attached:

i) **Activity 4.13 Sheet**
ii) **Syllabus page on topic C11.0 Metals**

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

QUESTION 1

This question is compulsory

Refer to **Activity 4.13** (taken from Science in Everyday Life Learners Book 2 and attached at end of question paper).

Study the activity and then answer the sub-questions below.

a) Suggest a topic and a sub-topic for a lesson involving Activity 4.13. [2]

b) What type of practical work is Activity 4.13 representing? Justify your response.[4]

c) State:

i) The **processes of science** learners engage in while working on the activity. Indicate the step where the process occurs, e.g. *Step 1- state process.* [10]

ii) Three examples of **scientific knowledge** learners may learn from engaging in Activity 4.13. [3]

d) Construct **three** learning outcomes that could be attained through a lesson involving the attached activity. [6]

QUESTION 2

The aims of practical work in science can be organised into five broad aims.

Discuss any **three** aims of practical work noting the positive aspects and the challenges of attaining each aim in the Swaziland school setting. [25]

QUESTION 3

Use the SGCSE Physical Science topic ***C11.0 Metals*** (see attached syllabus section) to guide responses to the items below:

a) Describe how **learning outcomes/instructional objectives** affect the selection of teaching methods for lessons on the above topic. [4]

b) For the sub-topic C11.2 Reactivity series:

i) Choose **two** teaching methods that might be suitable for teaching learners the content dealt with in the sub-topic. **Describe** the characteristics of each chosen method. [4]

ii) Explain your choice of the two methods. [5]

iii) Construct a test and its marking to ensure validity and reliability criteria. [12]

QUESTION 4

Assessment objectives of the SGCSE Physical Science syllabus provide for the assessment of investigative and experimental skills.

Discuss assessment in the context of investigative and experimental skills in Physical Science – Chemistry noting the following:

- Why it is important to assess such skills in Physical Science;
- How such skills are assessed; and
- The requirements from schools to ensure that assessment of such skills is fair to candidates.

[25]

QUESTION 5

Preparing for chemistry instruction requires teachers to prepare schemes of work.

Discuss schemes of work in the chemistry context indicating the following:

The meaning of scheme of work
The components of a scheme of work
The importance of preparing of a scheme of work

[25]

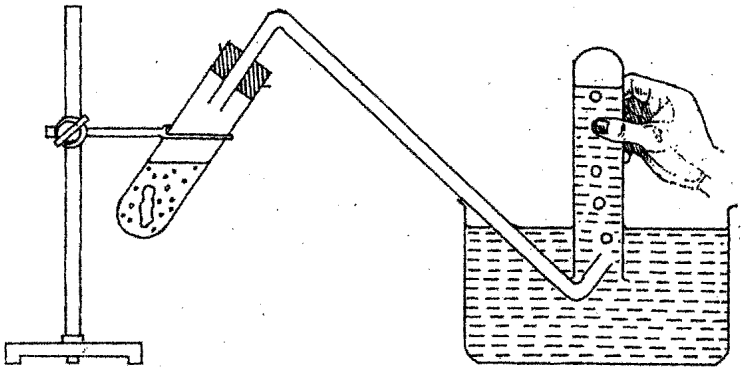
ACTIVITY

Activity 4.13 What forms when a metal reacts with an acid?

Nontobeko wanted to know what the white substance was and how it had formed. Carry out an experiment to help her find out.

You will need: dilute hydrochloric acid, magnesium ribbon, steel wool, four test tubes, a test tube rack, four stoppers, glass tubing, a Bunsen burner, a splint and water in a container

1. Read the instructions that follow and set up your apparatus as shown in the diagram.



2. Scrape the surface of the magnesium ribbon using the steel wool to remove the top layer.
3. Dip the magnesium ribbon into the acid and quickly close the test tube to avoid loss of the gas.
4. Let the first few bubbles go before you collect the gas. Explain why it is important to release the first few bubbles.
5. Collect three test tubes of the gas produced, put them in a test tube rack and make sure they are tightly closed.
6. Light up the splint and insert it in each of the test tubes as soon as you open it.
7. Record your observations in your exercise book.
8. Repeat step 6 with another test tube, but this time, leave the test tube open for a short while before inserting the lighted splint.
   (a) Record your observations.
   (b) Give a reason for the observations in (a) above.
   (c) Use your observations and explanation in (a) and (b) above to compare the density of the gas to that of air.

9. What gas do you think has been produced?

   The 'pop' sound that is produced when the lighted splint is inserted into the test tube containing the gas indicates that the gas is hydrogen. The 'pop' sound is a little explosion that occurs because hydrogen burns quickly. This means that it is highly flammable. What do you think would be the problems of having hydrogen as one of the main gases found in air?

   Hydrogen is less dense than air. Therefore when a test tube containing the gas is opened, facing the right side up, the gas quickly escapes and moves upwards.

   Do not spill the solution that remains in the reaction test tube after the gas has been collected. You will need it for Activity 4.14.

10. What do you think would happen if the magnesium ribbon were coated with grease (or petroleum jelly) before being dipped into the acid? Explain your answer. Your teacher may do a short demonstration to illustrate what would happen. Did you correctly explain how the attendant's grease protected Nontobeko's battery in the Over to you questions?

What do you think the solution that remains after collecting the gas contains? Do the activity below to find out.

C9.2 Group properties

1. describe the relationship between group number and the number of outer electrons
2. describe lithium, sodium and potassium in Group I as a collection of relatively soft metals showing a trend in melting point, density and in reaction with water
3. predict the properties of other elements in the Group given data, where appropriate
4. describe chlorine, bromine and iodine in Group VII as a collection of diatomic non-metals showing a trend in colour and state of matter; and state their reactions with other halide ions
5. predict the properties of other elements in the Group given data where appropriate
6. identify trends in other groups given information about the elements concerned

C9.3 Transition elements

1. investigate the characteristic physical properties (density, fixed points, hardness, conductivity and colours of compounds) and chemical properties (variable oxidation states) of the transition metals and their compounds, exemplified by copper and iron
2. state the use of transition elements as catalysts

C10.4 Noble gases

1. describe the noble gases as being unreactive
2. describe the uses of noble gases in providing an inert atmosphere, e.g., argon in lamps; helium for filling weather balloons

C11.0 Metals

C11.1 Properties

All learners should be able to:
compare the general physical and chemical properties of metals with those of non-metals

C11.2 Reactivity series

1. place in order of reactivity: calcium, aluminium, copper, (hydrogen), iron, magnesium, potassium, sodium, zinc and gold by reference to their reactions, if any, with aqueous ions of other metals, reaction with: water, steam and dilute hydrochloric acid
2. account for the apparent unreactivity of aluminium in terms of the oxide layer adhering to the metal
3. deduce an order of reactivity from a given set of experimental result
4. design experiments to investigate the order of reactivity of metals

C11.3 Extraction of metals

1. describe the ease in obtaining metals from their ores by relating the elements to the reactivity series.
2. name metals that occur native including copper and gold
3. name the main ores of aluminium, copper and iron
4. describe the essential reactions in the extraction of iron in the Blast Furnace
5. outline the manufacture of aluminium from pure aluminium oxide using electrolysis
6. describe the importance of conserving resources
7. describe the environmental impact of the mining and extraction of metals on vegetation , plants, human beings and animals

C11.4 Uses of metals

1. define an alloy as a mixture of a metal with other elements.
2. state the composition of elements in the following alloys: brass, bronze, mild steel and stainless steel
3. draw the structural diagrams to show how atoms of other elements can change the properties of the main element in an alloy
4. explain why alloying affects the properties of metals
5. state the important uses of alloys: brass, bronze, mild steel and stainless steel
6. state the uses of aluminium (aircraft bodies and food containers), and copper (electrical wiring, cooking utensils) related to their properties
7. state the uses of zinc for galvanizing and making brass

C11.0 Electricity and chemistry

All learners should be able to:

1. describe electrolysis
2. draw a labelled circuit diagram for an electrolytic cell, using the terms electrode, electrolyte, anode and cathode
3. describe the electrode products formed in the electrolysis of copper chloride (aqueous solution) between inert electrodes (platinum or carbon)
4. describe electrolysis in terms of the ions present and reactions at the electrodes in examples given.
5. state the general principle that metals or hydrogen are formed at the negative electrode and that oxygen or halogens are formed at the positive electrode