UNIVERSITY OF SWAZILAND

FACULTY OF EDUCATION

MAIN EXAMINATION PAPER

B. Ed. II/PGCE

November/December 2013

Title of paper: Curriculum Studies inChemistry

Course number: EDC 279

Time allowed: 3 hours

Instructions:

1. This paper contains FIVE questions.
2. Choose and answer any FOUR questions.
3. Marks for each 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

Three page attachment:

Sheet A	**Reactions of metals with water**
Sheet B	**Syllabus Section: Acids, bases and salts**
Sheet C	**Concentration**

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

QUESTION 1

Suppose you decide to use the demonstration method to teach concepts in the sub-topic *C9.2 Group Properties* (see relevant Physical Science (Chemistry Section) provided below. And Information Sheet A attached).

C9.2 Group properties

All learners should be able to:

- describe the relationship between group number and the number of outer electrons.
- 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
- predict the properties of other elements in the Group given data, where appropriate
- describe chlorine, bromine and iodine in Group VII as a collection of diatomic non-metals showing a trend in colour and state their reaction with other halide ions.
- predict the properties of other elements in the Group given data where appropriate.

a) What concepts in the sub-topic might the demonstration method be suitable for? Justify your answer. [10]

b) Outline how you might go about using the demonstration method to ensure the pupils learn the expected concepts. [10]

c) What might be the role of the lecture method in teaching the concepts identified in (a) above? [5]

[25]

QUESTION 2

The SGCSE Physical Science examination assesses practical skills and investigationsthrough two approaches.

a) Identify the two approaches used in assessing practical skills. [2]

b) Compare and contrast these two approaches for the assessment of practical skills and investigations. [13]

b) What are the strengths and limitations of each of these approaches? [10]

[25]

QUESTION 3

The aims of practical work include developing pupils' affective, cognitive, physical and interpersonal abilities.

Using specific examples from*Topic 8: Acids, bases and salts,* (see relevant Physical Science (Chemistry Section) –Sheet B attached) show how practical work may contribute to pupils' development of abilities in each of these domains. [25]

QUESTION 4

Study the information on Sheet C (attached), and then answer the questions that follow.

a) Pupils can carry out practical work following the standard practical, teacher guided inquiry or unguided inquiry.

Which approach to practical work might you place Activity 2 given on Sheet C? Justify your response. [10]

[25]

b) Identify and specify the following:

(i) **Three examples** of processes of science pupils may engage in while carrying out Activity 2. [6]

(ii) **Three examples** of scientific knowledge pupils may learn from the information on sheet C. [6]

(iii) **Physical skills** pupils may engage in carrying out Activity 2. [3]

[25]

QUESTION 5

a) Use information on Sheet C when responding to the questions below.

i) Construct **three** instructional objectives for a lesson involving the passage attached as Sheet C. Objectives should be of **mixed demands**. [6]

ii) Why might you need to construct objectives for a lesson involving the information on Sheet C? [3]

iii) Construct three assessment items you may use to assess learning during a lesson involving the attached information. [6]

b) i) State three factors that might affect pupils motivation to learnchemistry. [3]

ii) Show how the factors identified in b)i) above may affect pupils' motivation. [7]

[25]

Sheet A
Question 1

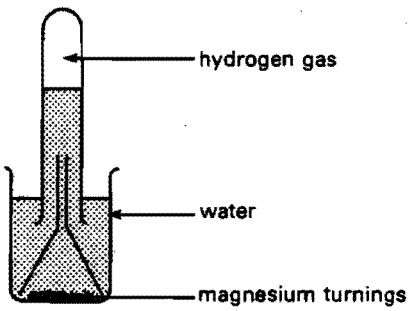
METAL	REACTION	EQUATION	ORDER IN REACTIVITY SERIES
potassium	It reacts violently on the surface of the water. Enough heat is produced in the reaction to melt the potassium into a ball and to light the hydrogen gas formed. The hydrogen burns with a lilac flame. The remaining solution is alkaline.	potassium + water → potassium hydroxide + hydrogen ↑ 2K + $2H_2O$ → 2KOH + H_2 ↑	*first*
sodium	It reacts violently on the surface of the water. Enough heat is produced to melt the sodium, but not enough to ignite the hydrogen gas formed. The remaining solution is alkaline.	sodium + water → sodium hydroxide + hydrogen ↑ 2Na + $2H_2O$ → 2NaOH + H_2 ↑	*second*
lithium	The lithium floats on the surface of the water reacting vigorously to produce hydrogen gas and an alkaline solution. The reaction is not as violent as that of sodium. Not enough heat is produced to melt the lithium or to ignite the hydrogen gas.	lithium + water → lithium hydroxide + hydrogen ↑ 2Li + $2H_2O$ → 2LiOH + H_2	*third*
calcium	Calcium sinks and reacts steadily producing hydrogen gas and leaving an alkaline solution.	calcium + water → calcium hydroxide + hydrogen ↑ Ca + $2H_2O$ → $Ca(OH)_2$ + H_2 ↑	*fourth*
magnesium	Magnesium turnings sink and a very slow reaction takes place, producing hydrogen gas.	magnesium + water → magnesium hydroxide + hydrogen ↑ Mg + $2H_2O$ → $Mg(OH)_2$ + H_2 ↑	*fifth*
	The apparatus needs to be left for several days to collect a single test tube of hydrogen gas. The solution left is slightly alkaline.		

Table 1

Sheet B

Question 3

SGCSE PHYSICAL SCIENCE Syllabus 6888
November 2009 and November 2010 Examinations

C8. Acids, bases and salts	
All learners should be able to: **C8.1 Characteristics and properties of acids and bases** - describe the characteristic properties of acids as reactions with metals, bases, carbonates and effect on litmus. - describe neutrality and relative acidity and alkalinity in terms of pH (whole numbers only) measured using Universal Indicator paper. - describe and explain the importance of controlling the acidity in soil. - prepare and use plant extracts as acid/base indicators. - define acids and bases in terms of proton transfer, limited to aqueous solutions. **C8.2 Types of oxides** - classify oxides as either basic or acidic related to metallic and non-metallic character of the element forming the oxide. **C8.3 Preparation of salts** - describe and prepare soluble salts from bases and ammonium salts. - prepare, separate and purify insoluble salts (see C3.2 – Methods of purification). **C8.4 Identification of ions** - describe and use the following tests to identify: **C8.4.1 Aqueous cations** - ammonium, calcium, copper (II), iron (II) and iron (III) zinc using aqueous sodium hydroxide and aqueous ammonia as appropriate. (Formulae of complex ions are **not** required). **C8.4.2 Aqueous anions** - carbonate (by reaction with dilute acid and then lime water), chloride (by reaction under acidic conditions with aqueous silver nitrate),	- use these ideas to explain specified reactions as acid/base. - classify other oxides as neutral or amphoteric.
iodide (by reaction ~~by reaction~~ under acidic conditions with aqueous lead (II) nitrate), nitrate (by reduction with aluminium to ammonia) and sulphate (by reaction under acidic conditions with aqueous barium ions). **C8.5 Identification of gases** - identify carbon dioxide using limewater. - identify hydrogen using a lighted splint. - identify oxygen using a glowing splint. - identify ammonia using damp litmus paper.	

Sheet C Question 4

Concentration

Concentration – although an increase in concentration means that there are more particles per unit volume and therefore an increased number of effective collisions, in general there is a concentration above which the reaction rate will decrease rather than increase. This is called the optimal concentration.

In the case of reactions involving gases, the pressure is an indication of the concentration of the gas, the greater the pressure the greater the number of particles per unit volume.

Investigating the effects of concentration

You will need:
Test tubes; test tube rack; hydrochloric acid of concentration 0.5 mol/dm^3 approximately; hydrochloric acid of concentration 1.0 mol/dm^3 approximately; two similar pieces of zinc metal; a stopwatch

Do the following:
1. Place 2 cm^3 of the 0.5 mol/dm^3 acid into one test tube in the test tube rack.
2. Place a piece of zinc metal into the test tube and start the stopwatch.
3. When the reaction ends stop the stopwatch; record the time.
4. Repeat the experiment with the more concentrated acid.
5. Comment on which reaction took the shorter time to completion.

Many reactions are carried out in solution with water as the solvent. In a concentrated solution there are more collisions so the reaction rate is faster than in a dilute solution.