

UNIVERSITY OF SWAZILAND
FACULTY OF EDUCATION
RESIT/SUPPLEMENTARY EXAMINATION PAPER

JULY 2017

B. Ed. III AND PGCE

Title of paper : Curriculum Studies in Chemistry II

Course number: EDC379 B.Ed. III
CTE530 PGCE

Time allowed : 3 hours

Instructions :

1. This paper contains FIVE questions
2. You may 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**
6. You may start with any question; however **follow the sequence of sub-questions** within a major question

Special Requirements

Two page attachment of SGCSE Physical Science Topic *C13.0 Organic chemistry*

QUESTION 1

- a) Give **four** functions of resources for teaching Chemistry? [8]
- b) Textbooks are a very important resource in chemistry teaching and learning.
- i) Describe the role of textbooks in chemistry teaching and learning. [7]
- ii) State **five** criteria relevant to concept development that a teacher might consider when selecting a textbook. Justify your response. [10]
- [25]

QUESTION 2

Students pre-existing beliefs about concepts influence how students learn new scientific knowledge and play an essential role in subsequent learning (Özmen, 2004).

In the context of chemistry, discuss the positive and negative effects of pre-existing learners' knowledge on teaching and learning. [25]

QUESTION 3

The relationship between science, science education and society has been recognised for decades.

Discuss the relationship between science and society showing positive and negative effects of each on the other. Use examples from chemistry to support your argument. [25]

QUESTION 4

Language plays a very important role in chemistry teaching and learning.

- a) Discuss the importance of language in teaching and learning of chemistry. [10]
- b) Discuss the challenges learners may experience from:
 - i) Learning chemistry in English as a Second Language. [8]
 - ii) The language of chemistry. [7]

[25]

QUESTION 5

Attached is a section of the SGCSE –Physical Science syllabus on the Topic *C13.0 Organic chemistry*

- a) Study the topic and its subtopics and:
 - i) Identify **three** sub-topics that make the topic relevant for Swaziland. [3]
 - ii) Justify your choice [9]

- b) Organic chemistry is considered difficult by many teachers and students.
Describe possible source(s) of learning difficulties regarding organic chemistry.

[13]

[25]

QUESTION 4

Language plays a very important role in chemistry teaching and learning.

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Describe possible source(s) of learning difficulties regarding organic chemistry.

[13]

[25]

2. describe the preparation, collection and properties of carbon dioxide
C12.6 Nitrogen <ol style="list-style-type: none">1. describe the need for nitrogen, phosphorus and potassium compounds in plant life2. describe the essential conditions in the manufacture of ammonia by the Haber process3. explain why the conditions used in the manufacture of ammonia are essential to obtaining the best yield of ammonia4. name the uses of ammonia in the manufacture of fertilisers e.g., ammonium sulfate, ammonium nitrate and in the manufacture of household detergents
C12.7 Carbon and carbonates <ol style="list-style-type: none">1. define allotropy as an existence of an element in two or more forms in the same physical state.2. name the allotropes of carbon as diamond, graphene and graphite3. describe the manufacture of calcium oxide (quick lime) in a kiln from calcium carbonate (limestone) in terms of the chemical reaction involved.4. state some uses of lime and slaked lime in treating acidic soil and neutralising acidic industrial waste products.5. describe the manufacture of cement using calcium carbonate6. describe the uses of calcium carbonate in the manufacture of iron, glass and cement7. interpret the ease of decomposition of metal carbonates in terms of the reactivity series
C13.0 Organic chemistry
All learners should be able to: C13.1 Name of compounds <ol style="list-style-type: none">1. name, and draw the structure of unbranched alkanes, alkenes, alcohols and acids containing up to six carbon atoms; and the products of the reactions stated in C12.5 -C12.8.2. state the type of compound present given a chemical name, ending in <i>-ane</i>, <i>-ene</i>, <i>-ol</i> or <i>-oic acid</i> or a molecular structure.
C13.2 Fuels <ol style="list-style-type: none">1. name as fuels coal, natural gas and petroleum.2. name methane as the main constituent of natural gas.3. describe petroleum as a mixture of hydrocarbons and its separation into useful fractions by fractional distillation.
C13.3 Uses of petroleum fractions <ol style="list-style-type: none">1. name the uses of the fractions:<ul style="list-style-type: none">• liquefied petroleum gas, as a fuel for cooking,• petrol in petrol engines,• the paraffin fraction in oil stoves and aircraft fuel,• the diesel fraction for fuel in diesel engines,• the lubricating fraction for lubricants and making waxes and polishes,• bitumen for making roads.2. discuss the hazards associated with the use of petroleum fractions
C13.4 Homologous series <ol style="list-style-type: none">1. describe the homologous series as a 'family' of similar compounds with similar properties due to the presence of the same functional group2. describe the general characteristics of a homologous series
C13.5 Alkanes <ol style="list-style-type: none">1. describe the properties of alkanes (exemplified by methane) as being generally unreactive, except in terms of burning.2. predict the structures of higher number of alkanes given the number of carbon atoms;3. explain physical trends in their density, fixed points and state of matter in relation to melting points
C13.6 Alkenes <ol style="list-style-type: none">1. describe the catalytic and thermal cracking of alkanes2. explain why cracking of longer chain alkanes to manufacture alkanes and hydrogen is an important industrial process3. describe the properties of alkenes in terms of:<ol style="list-style-type: none">(a) combustion,(b) addition reactions with<ul style="list-style-type: none">• bromine• hydrogen• and steam4. distinguish between saturated and unsaturated hydrocarbons from molecular structures and by simple

chemical tests (use of bromine and potassium manganite (VII)).

5. describe the formation of poly(ethene) as an example of addition polymerisation of monomer units.
6. explain why non-biodegradable plastics cause serious pollution problems

C13.7 Alcohols

1. describe the formation of ethanol by the catalytic addition of steam to ethene
2. describe the formation of ethanol (and carbon dioxide) by fermentation and its importance to the wine and brewing industry.
3. describe the properties of alcohols in terms of combustion and dehydration
4. state the uses of ethanol as:
 - a solvent,
 - a fuel,
 - for sterilisation.
 - as a constituent of alcoholic beverages
5. state the advantage of using alcohol as a fuel over petrol

C13.8 Carboxylic acids

1. describe the formation of ethanoic acid by the
 - oxidation of ethanol
 - the action of atmospheric oxygen
2. describe the reaction of ethanoic acid with ethanol to give an ester (ethyl ethanoate), a sweet-smelling compound
3. state the uses of esters as components of flavouring and perfumes

C13.9 Macromolecules

1. describe macromolecules (polymers) in terms of large molecules built up from small units (monomers), different macromolecules having different units and/ or different linkages.
2. classify macromolecules as man-made/synthetic (poly(ethene), terylene, nylon) and natural (fats, proteins, carbohydrates).
3. state the monomers of the natural and synthetic macromolecules (carbohydrates, fats, nylon, poly(ethene), proteins and terylene)
4. describe the formation of poly(ethene) as an example of addition polymerisation of monomer units
5. describe the formation of carbohydrates, fats and proteins, nylon and terylene macromolecules as examples of condensation polymerisation
6. draw part-structures of the following macromolecules:
 - poly(ethene),
 - nylon,
 - terylene,
 - fats,
 - proteins
 - and carbohydrates macromolecules
7. identify monomers from the structures of given macromolecules