UNIVERSITY OF SWAZILAND

FACULTY OF EDUCATION

DEPARTMENT OF CURRICULUM AND TEACHING

MAIN EXAMINATION PAPER

M. Ed. Curriculum and Teaching

December 2012

Title of paper: Curriculum Studies: Chemistry I

Course number: EDC 646

Time allowed: Three (3) hours

Instructions:

1. This paper contains SIX questions.
2. Choose and answer ANY FOUR questions
3. Answer questions and sub-questions in continuous essay form. Question numbers must be adhered to.
4. Marks will be awarded for articulation and integration of ideas
5. Questions carry marks as indicated.
6. Any piece of material or work that is not intended for marking purposes should be clearly CROSSED OUT. Ensure that responses to questions are NUMBERED CORRECTLY.

Special Requirements

SGCSE Physical Science syllabus 6888 (Chemistry section)

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

QUESTION 1

a) Opinions regarding the nature of science and its teaching at secondary school level are diverse. However, there is consensus that the nature of science must be taught at school level.

i) Discuss the reasons justifying the teaching of the nature of science at school level. [11]

ii) What might teaching the nature of science at secondary school level encompass? [8]

b) Identify and discuss three characteristics that make a field of study more scientific. [6]

QUESTION 2

Trowbridge and Bybee (1990) provide aims of science education that relate to ***scientific knowledge and scientific method***; ***societal needs, personal needs,*** as well as ***career needs***.

Choose and discuss **three** of these aims in the context of the SGCSE Physical Science (chemistry) curriculum offered in Swaziland. (You may use the attached copy of the SGCSE Physical Science Syllabus). [25]

QUESTION 3

Mbajiorgu (2006) suggests a number of factors that any chemistry curriculum developed must consider. Some of these are: ***nature and amount of chemistry content, appropriate assessment approaches; laboratory work***; as well as ***relevance to real life situations.***

Explain the importance of observing these five factors in developing a chemistry curriculum. [25]

QUESTION 4

Scientific inquiry (method) is usually presented as if it follows a sequential series of simple steps.

Outline and discuss the nature of scientific inquiry showing why the stepwise presentation of scientific inquiry is misleading. [25]

QUESTION 5

The three boxes below give information on the development of the process of burning through a long period civilization that is often used to illustrate the chemical revolution.

Aristotle was a Greek teacher who lived 2 300 years ago. *He was the teacher of Alexander the Great. Aristotle studied nature and developed ideas about natural processes. One of the natural processes he studied was burning.* *Aristotle's theory was that all matter was made up of a mixture of four elements. The elements were Earth, Water, Air and Fire.* *Different materials contained different proportions of Earth, Water and Air, and this is what gave the materials different properties.* *Fire, a fourth element, could be used to combine or separate the Earth, Air and Water.* *Aristotle argued that when something burnt the Air was liberated upwards as smoke and the Earth fell downwards as ash.*	*Georg Stahl was a German doctor who helped patients who were mentally disturbed.* *He was also interested in what happened when things burnt.* *Stahl developed his theory of burning in the closing years of the seventeenth century.* *He thought when things burn they give out a substance called phlogiston.* *Things that burnt brightly and fiercely contained a lot of phlogiston.* *Things that burnt slowly, or not at all, contained little or no phlogiston.* *In support of his theory, Stahl was able to point to how what burnt changed its properties.*

Antoine Lavoisier lived between 1743 and 1794.

He studied what happened when metals were burnt.

From his careful experiments involving weight relations in chemical reactions, he confirmed that when metals burnt their mass increased.

Lavoisier's theory was that matter is made up of many different elements not Earth, Water, Air and Fire. The properties of the different elements could be studied in the laboratory. One of these elements was oxygen.

Lavoisier suggested that elements combine in different ways to make new substances.

When something burns, oxygen combines with the other elements in the substance to form oxides. Sometimes the oxides are solids - as with metals.

Sometimes the oxides are gases - as with carbon dioxide and sulphur dioxide.

The chemical revolution is one way in which Kuhn illustrates the scientific revolution. Discuss **five** of the main features of the scientific revolution. [25]

QUESTION 6

De Jong (2006:1) notes that "*Chemical education reform is under way in many countries. An important reason for this reform is the growing dissatisfaction with the position of many chemistry curricula.*"

a) What might be the main causes of the concerns about chemistry curricula that drive curriculum reforms? [4]

b) Discuss STS as a strategy for making chemistry curricula more satisfactory. [21]