

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF SWAZILAND

C615

SPECIAL TOPICS IN ENVIRONMENTAL CHEMISTRY

MAY 2013

FINAL EXAMINATION

Time Allowed:

Three (3) Hours

Instructions:

- 1. This examination has six (6) questions.**
- 2. Answer any four (4) questions fully; diagrams should be clear, large and properly labeled. Marks will be deducted for improper units and lack of procedural steps in calculations.**
- 3. Each question is worth 25 marks.**

Special Requirements

NONE

YOU ARE NOT SUPPOSED TO OPEN THIS PAPER UNTIL PERMISSION TO DO SO HAS BEEN GIVEN BY THE CHIEF INVIGILATOR.

C615 SPECIAL TOPICS IN ENVIRONMENTAL CHEMISTRY

SECTION A: ENVIRONMENTAL TOXICOLOGY

QUESTION 1

Write a brief summary on the relevance of environmental toxicology to the human species.
(25 Marks)

QUESTION 2

Discuss the variables affecting toxicity and toxicity testing.
(25 Marks)

QUESTION 3.

- (i) Describe the ways in which toxicants interact with cells.
 - (ii) Summarise integumentary, respiratory and digestive routes of toxicant absorption.
- (25 Marks)

SECTION B: ENVIRONMENTAL LAW

Question 4[25]

- (a) In relation to the Environment Management Act 2002 of the Swaziland statutes,
- (i) Explain how international conventions have lead to the development of this legislation. (4)
 - (ii) Explain how the Environment Management Act 2002 has superceded the Swaziland Environmental Authority Act 1993. (4)
- (b) In relation to the Water Pollution Control Regulations of 2010,
- (i) Explain the “Polluter – Pays” principle, and how the Water Pollution Control Regulations of 2010 effects this principle. (4)
 - (ii) Explain the role of public participation fora on the processes that led to the gazetting of these regulations. (4)
- (c) Explain the procedures for handling spills in so far as the Water Pollution Control Regulations of 2010 is concerned. (4)
- (d) International treaties and conventions govern water usage and its quality for transboundary rivers.
- (i) Under which river basin authorities do the following fall:
 - Lusushwana River at Matsapha? (1)
 - Mlumati River in Matsamo? (1)
 - (ii) Briefly discuss the Inco Maputo Agreement in relation to the protocol on shared water courses between Swaziland, Mozambique and South Africa. (3)

Question 5[25]

- (a) In relation to the Swaziland Air Pollution Control Regulations of 1999,
- (i) Explain how international conventions have lead to the development of this legislation. (4)
 - (ii) Explain how pulp mills have adopted emission controls to comply with this legislation. (4)
- (b) In relation to the Swaziland Ozone Regulations of 2003,
- (i) Discuss the international convention that led to these regulations. (4)
 - (ii) Describe the process that the Swaziland Environment Authority has undertaken to result in the gazetting of these regulations. (5)
- (c) In regard to ozone depleting substances (ODS),
- (i) List the ODS compounds that are being phased out in Swaziland and enforced by law. (2)
 - (ii) List the industries that are affected by this legal phasing out of ODS. (3)
 - (iii) Describe any three principal ways in which the phasing out of ODS is enforced in Swaziland. (3)

Question 6[25]

- (a) Legislation that protects soils against pollution in Swaziland currently does not exist, but soil pollution control is a requirement of any development proposal in terms of the Swaziland Environment Authority (SEA's) Environmental Audit and Assessment Regulations (EAAR) OF 2000.
- (i) Discuss the international laws that led to the establishment of the Swaziland Environment Authority (SEA). (4)
 - (ii) Describe how a "Proponent" of a proposed development is legally obliged to follow the EAAR of 2000. (4)
- (b) The pollution of soils by hazardous substances that cross the borders is controlled by the Basel Convention.
- (i) Outline the principles of the Basel Convention and its implications on the usage of hazardous waste disposal facilities by Swaziland in South Africa. (4)
 - (ii) Outline how the convention relates to the Swaziland Waste Regulations of 2000 . (4)
 - (iii) Outline how the convention affects any proposals for strategic petroleum industry development in Swaziland, especially in regards to waste oil disposal. (4)
- (c) Describe the role of a "data base" in environmental monitoring of soil pollution against persistent organic pollutants (POPs) using international allowable limits of the USEPA. (5)