

UNIVERSITY OF SWAZILAND
FINAL EXAMINATION - 2010/2011

TITLE OF PAPER : Special Topics in Environmental Chemistry

COURSE NUMBER : C615

TIME : Three (3) Hours

INSTRUCTIONS : There are six (6) questions. Answer **ANY FOUR** Questions Fully. Diagrams should be clear, large and properly labelled. Marks will be deducted for improper units and lack of procedural steps in calculation.

Each question carries 25 marks.

You must not open this examination paper until the chief invigilator has granted permission to do so.

Question 1 (25 Marks)

- (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 marks)
 - (ii) Explain how the Environment Management act 2002 has superseded the Swaziland Environmental Authority Act 1993. (4 marks)
- (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 marks)
 - (ii) Explain the role of public participation for on the processes that led to the gazetting of these regulations. (4 marks)
- (c) Explain the procedures for handling spills in so far as the Water Pollution Control Regulations of 2010 is concerned. (4 marks)
- (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 mark)
 - Mlumati River in Matsamo? (1 mark)
 - (ii) Briefly discuss the Inco Maputo Agreement in relation to the protocol on shard water courses between Swaziland, Mozambique and South Africa. (3 marks)

Question 2 (25 Marks)

- (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 marks)
 - (ii) Explain how pulp mills have adopted emission controls to comply wit his legislation. (4marks)

- (b) In relation to the Swaziland Ozone Regulations of 2003,
- (i) Discuss the international convention that led to these regulations. (4 marks)
 - (ii) Describe the process that the Swaziland Environmental Authority has undertaken to result in the gazetting of these regulations.(5 marks)
- (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 marks)
 - (ii) List the industries that are affected by this legal phasing out of ODS. (3 marks)
 - (iii) Describe any three principal ways in which the phasing out of ODS is enforced by law. (2 marks)

Question 3 (25 Marks)

- (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 marks)
 - (ii) Describe how a "Proponent" of a proposed development is legally obliged to follow the EAAR of 2000. (4 marks)
- (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 marks)
 - (ii) Outline how the convention relates to the Swaziland Waste Regulations of 2000. (4 marks)
 - (iii) Outline how the convention affects any proposals for strategic petroleum industry development in Swaziland especially in regards to waste oil disposal. (4 marks)

- (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 marks)

Question 4 (25 Marks)

- (a) Define the term “environmental toxicology” and explain in detail how it impacts human life each day. (12 marks)
- (b) Briefly describe the major classes of pollutants and outline the main routes by which pollutants enter ecosystems. (13 marks)

Question 5 (25 Marks)

- (a) Briefly comment on the fate of metals and radioactive isotopes in contaminated ecosystems. (8 marks)
- (b) Describe the fate of organic pollutants in individuals. (8 marks)
- (c) Write briefly notes on the biochemical effects of the toxicity to mammals of the following substances:
- (i) Nitromethane
 - (ii) Lead
 - (iii) White phosphorus. (9 marks)

Question 6 (25 Marks)

- (a) Explain the following terms in relation to environmental toxicology:
- (i) Toxins (3 marks)
 - (ii) Toxicity (3 marks)
 - (iii) Xenobiotics (3 marks)
- (b)
- (i) Describe the different types of toxicity (4 marks)
 - (ii) Explain how toxicants are classified (4 marks)
 - (iii) Outline the steps involved in toxicity testing (4 marks)
 - (iv) Which variables affect toxicity and toxicity testing? Explain. (4 marks)