UNIVERSITY OF SWAZILAND
Faculty of Health Sciences

(BSC) IN ENVIRONMENTAL HEALTH

SECOND SEMESTER FINAL EXAMINATION PAPER MAY 2013

TITLE OF PAPER	:	ENVIRONMENTAL CHEMISTRY 11
COURSE CODE	:	EHS 414
DURATION	:	TWO HOURS
MARKS	:	100
INSTRUCTIONS	:	ANSWER ONLY FOUR QUESTIONS
	:	EACH QUESTION CARRIES 25 MARKS
	:	QUESTIONS ONE AND TWO ARE COMPULSORY
	:	NO QUESTION PAPER SHOULD BE BROUGHT INTO THE EXAMINATION ROOM
	:	BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY THE INVIGILATOR

QUESTION ONE

This question is compulsory

1. The correct sequence of layers of the atmosphere from the innermost to outermost is
   (a) mesosphere-stratosphere-thermosphere-troposphere
   (b) troposphere-stratosphere-mesosphere-thermosphere
   (c) stratosphere-thermosphere-troposphere-mesosphere
   (d) thermosphere-stratosphere-mesosphere-troposphere

2. Stratospheric ozone
   (a) screens out ultraviolet radiation
   (b) allowed the evolution of life on land
   (c) prevents ozone formation in the troposphere
   (d) all of these answers.

3. Human health depends on having
   (a) low amounts of ozone in the stratosphere
   (b) enough ozone in the stratosphere and little ozone in the troposphere
   (c) high amounts of ozone in the troposphere and low amounts in the stratosphere
   (d) high amounts of ozone in the troposphere and stratosphere.

4. Humans can disrupt earth's gaseous biogeochemical cycles through
   (a) addition of carbon dioxide from combustion
   (b) mining limestone
   (c) emitting waste heat from air conditioners
   (d) using mister systems to water crops

5. Ozone which contributes to the formation of smog is found in the
   (a) troposphere
   (b) mesosphere
   (c) thermosphere
   (d) stratosphere

6. Human health problems closely associated with ozone depletion include all of the following except
   (a) Skin cancer
   (b) Eye cataracts
   (c) Increased incidence of heart disease
   (d) Suppression of the immune response

7. All of the following are volatile organic compounds (VOCs) except
   (a) methane
   (b) chlorofluorocarbon
   (c) carbon monoxide
   (d) benzene

8. All of the following describe soils that are vulnerable to acid deposition except
   (a) thin
   (b) low in buffering ions
   (c) high in hydroxyl (OH^-) ions
   (d) acidic.

9. Asbestos has been used for the following except
   (a) fire proofing
   (b) insulation of refrigerators
   (c) insulation of heaters and pipes
   (d) wall and ceiling decoration

10. Of the following motor vehicle fuels, the greatest polluter is
   (a) gasoline
   (b) hydrogen gas
   (c) alcohol
   (d) natural gas

11. The greenhouse effect is best described as
   (a) consensus science
   (b) pioneer science
   (c) fantasy
   (d) a convention florists

12. The major greenhouse gases include all of the following except
   (a) chlorofluorocarbons (CFCs)
   (b) carbon dioxide and water vapour
   (c) sulphur dioxide
   (d) ozone and nitrous oxide.

13. Increased greenhouse gases originate from
   (a) burning fossil fuels
   (b) use of CFCs
   (c) deforestation
   (d) all of these answers.

14. The threat to global warming can be addressed by
   (a) using energy more efficiently
   (b) halting deforestation
   (c) slowing population growth
   (d) all of the above

15. Nitrates and Phosphates are examples of
    (a) disease-causing agents
    (b) oxygen-demanding wastes
    (c) organic plant nutrients
    (d) Inorganic plant nutrients.

16. The three major classes of pollutant hydrocarbons are
    a. Alkanes, alkynes, alkenes
    b. Alkanes, alkenes, cyclic hydrocarbons
    c. Alkanes, alkenes, aromatic hydrocarbons
    d. Alkenes, alkanes, halogenated hydrocarbons

17. An organ-halide that is a known human carcinogen is

    (a) Vinyl chloride
    (b) PCBs
    (c) PBBs
    (d) Perspex

18. Alkanes undergo
    (a) Addition reactions only
    (b) Combustion reactions only
    (c) Addition and substitution reactions only
    (d) Combustion and substitution reactions only

19. Compounds with an oxygen atom bridging between two carbons are
    (a) Oxides
    (b) Organic acids
    (c) Ethers
    (d) Aldehydes

20. Alkenes can react with ----to produce a species in which three oxygen atoms are bridged between two carbon atoms
    (a) aldehydes
    (b) ozone
    (c) esters
    (d) ketones

21. Alkenes undergo
    (a) Substitution reactions and addition reactions
    (b) Substitution reactions only
    (c) Combustion reactions and addition reactions

(d) Addition reactions only

22. Among the aliphatic hydrocarbons, which ones are unsaturated
    (a) Alkenes
    (b) Alkanes
    (c) Alkanes and alkynes
    (d) Alkenes and alkynes

23. Which of the following compounds undergo resonance?
    (a) Benzene
    (b) Naphthalene
    (c) Xylenes
    (d) TNT

24. Which chlorinated biphenyl has an effect of reducing the size of the penis in men and enlarging the size of the vagina in females?
    (a) PCBs
    (b) PBBs
    (c) Methyl Phenol
    (d) DDT

25. Which of the following hydrocarbons is characterized with the presence of a triple bond?
    (a) Propylene
    (b) Butyne
    (c) Ethane
    (d) Ethanol

TOTAL 25 MARKS

QUESTION TWO

Draw the structure of the following organic pollutants and list their environmental and health impacts

1. Polyvinyl chloride (5 marks)
2. Acrylonitrile (5 marks)
3. DDT (5 marks)
4. Benzene (5 marks)
5. Naphthalene (5 marks)

TOTAL 25 MARKS

QUESTION THREE

Discuss the sources, chemical reactions and environmental effects of the following substances in the atmosphere. Propose one way of controlling each of them.

1. nitrogen oxides (7 marks)
2. sulfur oxides (6 marks)
3. carbon monoxide (6 marks)
4. carbonyl sulfide (6 marks)

TOTAL 25 MARKS

QUESTION FOUR

Discuss the nature, uses, and sources of lead in the environment and explain why lead is of Environmental and health concern

TOTAL 25 MARKS.

QUESTION FIVE

1. Discuss the nature, uses, and sources of PCBs and explain the properties that have made them popular in use and in the same way posing environmental challenges (19 marks)
2. Describe with the aid of balanced chemical equations the effect of CFCs on the chemistry of the ozone layer (6 marks)

TOTAL 25 MARKS