



# KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS**  
**2017/2018 ACADEMIC YEAR**  
**FOURTH YEAR SECOND SEMESTER**  
**MAIN EXAMINATIONS**  
**FOR THE DEGREE OF SCIENCE**

**COURSE CODE:** SCH 451

**COURSE TITLE:** ATMOSPHERIC CHEMISTRY

**DURATION:** 2 HOURS

**DATE:** 31/7/2018 **TIME:** 2-4PM

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## INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.
- You are provided with graph papers where necessary.

This paper consists of 4 printed pages. Please Turn Over



QUESTION ONE (30 MARKS)

- a) State the processes involved and complete the following three equations' that shows the fate or sink of atmospheric Carbon dioxide.[3marks]
- $\text{CO}_2 + \text{H}_2\text{O} + \text{Sunlight energy} \longrightarrow$
  - $\text{CH}_4 + 2\text{O}_2 \longrightarrow$
  - $\text{CO}_2 + \text{H}_2\text{O} + \text{CaCO}_3 \longrightarrow$
- b) By the use of example differentiate between a primary and secondary air Pollutants [3marks]
- c) Complete the following atmospheric equations [4marks]
- photolysis of Ozone :  $\text{O}_3 + h\nu \longrightarrow$
  - Heterogeneous reaction of  $\text{N}_2\text{O}_5$  and  $\text{H}_2\text{O}$  aqueous)  $\longrightarrow$
- d) What are the major roles played by particles in the Atmosphere in chemical reactions?[2marks]
- e) Explain the mechanism of green house effect then state the effect of green house Effect in the atmosphere [5 marks]
- f) Name the four divisions of the atmosphere [4marks]
- g) Define climate change [2marks]
- h) What is atmospheric chemistry [2marks]
- i) Define the term CFC and write the formulas for the two most common CFCs. Give one use of each CFC you mention [5marks]

**QUESTION TWO**

- a) Explain what the Chapman mechanism of atmospheric reaction is. Use relevant chemical reaction mechanisms.[10 marks]
- b) Explain how ozone is produced and the role in the stratosphere [5marks]
- c) Discuss four effects of human health that scientist believe will result from ozone depletion [5 marks]

### QUESTION THREE (20MARKS)

a) Hydroxyl (HO\*) is the single most important intermediate species in the atmospheric

i) State and explain the process of formation of hydroxyl (HO\*) ion in the atmosphere [5 marks]

ii) Hydroxyl Radical is phrased as “ The Atmosphere’s Detergent “ because it removes chemicals from the atmosphere. Using relevant examples , Explain how the hydroxyl radical removes the chemicals from the atmosphere. [5 marks]

iii) How is the HO\* radical commonly removed from the atmosphere? [5 marks]

iv) Explain how effective CO<sub>2</sub> concentration differ conceptually and numerically from the real CO<sub>2</sub> concentration in the air [5 marks]

### QUESTION FOUR(20MARKS)

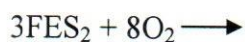
4 a) Describe the following classes sampling or measurements of air quality. [10 marks]

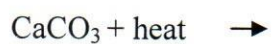
- I. Emission Measurements:
- II. Meteorological measurements:
- III. Ambient air quality:
- IV. Industrial hygiene sampling:
- V. Residential indoors sampling:

b) Differentiate between Real Time Measurements and Intermittent as sampling techniques [3marks]

c) Complete the following chemical reactions for Inorganic Particle Formation, given the following guiding statements:

i. Solid oxides formation [4 marks]

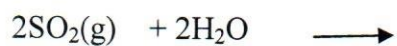
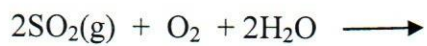




ii. Gases reacting to produce liquid – forming compounds which could be hygroscopic

or form aerosol droplets

[3marks]



### QUESTION FIVE (20MARKS)

a) Using examples, discuss the four main causes of global warming [10marks]

b) Explain the importance of atmosphere [10 marks]