

CHUKA UNIVERSITY EXAMINATIONS (2019/2020)

CHEM 334: ENVIRONMENTAL CHEMISTRY I

STREAMS: BSc (CHEM); BSc(ENV SCI)

TIME: 2 HRS

INSTRUCTIONS

Answer question **One** (Compulsory) and any other **Two** questions

QUESTION ONE [30 MARKS]

- (a) Explain the variations of temperature with altitude in different layers of the atmosphere (**4 marks**)
- (b) List six health and environmental effects of UV-B radiation (**3 marks**)
- (c) Write the two equations for the non-catalytic destruction of ozone in the atmosphere (**2 marks**)
- (d) Write the equations for catalytic destruction of ozone in the stratosphere by free radicals both in the presence and absence of atomic oxygen (**3 ½ marks**)
- (e) State two major sources of atmospheric nitric oxide, sulphur oxides and ozone depleting substances (**3 marks**)
- (f) Discuss the causes and effects of the *Minamata* disease (**4 ½ marks**)
- (g) Describe in details how the chemical oxygen demand (COD) of water samples is determined experimentally (**4 marks**)
- (h) Describe the production, advantages and disadvantages of biodiesel over crude oil produced diesel (**6 marks**)

QUESTION TWO [20 MARKS]

- (a) Explain ozone depletion and formation of ozone holes in the Antarctica regions (**10 marks**)
- (b) Discuss the catalytic technology that is used to control emissions from gasoline internal combustion engines (**6 marks**)
- (c) Discuss two technologies that are commonly used to remediate contaminated soils (**4 marks**)

QUESTION THREE [20 MARKS]

- (a) (i) Define the greenhouse effect (**1½ marks**)
- (ii) List six major greenhouse gases (**3 marks**)
- (b) Discuss the formation and environmental effects of acid rain (**6 marks**)
- (c) Explain three technologies used for disinfection of drinking water (**3 marks**)
- (d) Describe the industrial production and uses of the polymer (**6½ marks**)
 - (i) Polylactic acid
 - (ii) Polycaprolactone

QUESTION FOUR [20 MARKS]

- (a) Discuss the formation and effects of photochemical smog (**8 marks**)
- (b) Explain five sources of major soil pollutants (**5 marks**)
- (c) State two major sources of formaldehyde, particulate matter and asbestos indoor air pollutant ion (**3 marks**)
- (c) (i) Explain three potential sources of hydrogen for fuel (**3 marks**)
- (ii) State two ways of storing hydrogen for vehicular usage (**1 mark**)