

UNIVERSITY OF RUHUNA
BACHELOR OF SCIENCE IN FISHERIES AND MARINE SCIENCES DEGREE
Level III Semester I – July 2015

LIM 3113 – Water and wastewater treatment

Time: 02 hours

Answer all questions.

01. Answer **both** parts

- a) Briefly describe treatment methods used in purification of potable water in Sri Lanka. (15 marks)
- b) A stagnant water body from Dry Zone of Sri Lanka has been selected as the source for a drinking water treatment plant. Describe important factors to be considered when abstracting water from this source for processing. (10 marks)

02. Answer **all** parts

Advanced Oxidation Processes (AOPs) refers to a set of chemical treatment procedures designed to remove organic / inorganic materials in water and wastewater by oxidation through reactions with “*hydroxyl radicals*”

- a) Indicate two most important features associated with “*hydroxyl radicals*” (2.5 marks)
- b) Why nitro-substituted aromatic compounds are considered to be biodegradable under anerobic conditions (2.5 marks)
- c) Indicate four different analytical methods which could be useful to identify substrate transformation. (04 marks)
- d) Write an equation to illustrate a formation of a hydroxyl radicals in a “*Fenton system*” under acidic conditions. (2.5 marks)

- e) Water strongly absorbs wavelengths shorter than 190 nm due to the increase of absorption cross section with the decreasing wavelength between the range of 190 nm to 160 nm.
- Define "*VUV photolysis*"
 - Provide two equations to show the "*VUV photolysis*" of water
 - If the *VUV photolysis* reaction solutions were aerated, H atoms and hydrated electrons are efficiently trapped by dissolved oxygen. Give two products which can be expected from the above reaction.

(06 Marks)

- f) The photolysis mechanisms of *nitrous acid*, *nitrite* and *nitrate* involve photolytic pathways that result in the formation of HO[•] and nitrogen species such as [•]NO, [•]NO₂ and ONOO[•] as primary photoproducts.

- Write reactions to show the above photoproducts for *nitrous acid*, *nitrite* and *nitrate*.
- Indicate the most reactive species out of the above photoproducts.

(05 marks)

- g) Provide two advantages of Advanced Oxidative Processes (AOPs)

(2.5 marks)

03. Write short notes on following;

- Advantages and disadvantages of trickling filters
- Recovery of activated sludge
- Dissolved Air Flootation (DAF) method
- Difference between oxidation ditch and aeration lagoon

(25 marks)

04. Explain major components of cleaner production assessment which can be implemented in the textile dyeing factory with special attention to increase resource efficiency (material and water), to be economical in wastewater treatment.

(25 marks)

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