

**Fenton-ASBR Process for Treatment of Oil Exploration Plant Wastewater
Containing Boron**

by

Nur Azreen Abu Bakar

Dissertation submitted in partial fulfilment of
the requirements for the
Bachelor of Engineering (Hons)
(Civil Engineering)

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CERTIFICATION OF APPROVAL

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Civil Engineering Programme
Universiti Teknologi PETRONAS
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Approved by:

(Dr Amirhossein Malakahmad)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
September 2013

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

NUR AZREEN ABU BAKAR

ABSTRACT

Oil Exploration Plant which contains hydrocarbons has been detected of producing wastewater containing boron. Boron is usually found in minerals such as borax, boric acid, kernite, ulexite, colemanite, and borates and usually all these minerals can be found in industries such as fertilizers, insecticides, and pharmaceuticals manufacturing. The objective of this experiment is to investigate the performance of Combined Fenton-Anaerobic Sequencing Batch Reactor process to treat the oil exploration plant wastewater containing boron. Anaerobic Sequencing Batch Reactor (ASBR) is a variation of the activated-sludge process and one form of Biological Treatment. Biodegradability of the wastewater is crucial in order to undergo a biological treatment. Hence, Fenton process is considered as a pre-treatment process to increase the biodegradability. The efficiency of Fenton process was determined by measuring the Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD₅) and boron concentrations. In 120 minutes, the Fenton process was able to remove 27-43%, of COD, 30-44% of BOD and significantly 70-83% of boron. Due to the biodegradability that increase from 0.33 to 0.39, the further treatment of ASBR reported about 27-93% of COD removal until it has met the Effluent Standard Regulations, as well as BOD₅ and boron concentration. The MLVSS also measured to determine the microbial population inside the reactor that affect the performance of SBR. The combination of Fenton and ASBR for treatment of oil exploration plant wastewater containing boron has been found efficient due to the success of fulfilling the standard requirement.

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