Chapter 1

Introduction

1.1 General

At the present time, anaerobic treatment process is receiving great attention once again. This is due to several advantages such as more saving on energy system, having lower excess sludge yield, etc., when compared to aerobic treatment process. Moreover the mechanism underlying the anaerobic pathway is known in greater details. There is much improvement both in designing and controlling digestion process; not be troublesome as earlier. So far several modern high-rate digesters have been available such as anaerobic filter (AF), anaerobic fluidized bed (AFB), anaerobic attached-film expanded bed (AAFEB), etc; almost all of them use materials for bacterial attachment in the reactor. The most interesting one among them is the upflow anaerobic sludge blanket (UASB) process. The main advantage is that it uses no material to support and concentrated biomass is retained in the reactor, instead. Nevertheless the satisfactory performance of the UASB process depends on the sludge cultivated which can exert good settleability, and is usually present in granular form. This may be regarded as the main feature of the UASB process, which in reverse, this can also be a limitation. Because the granular sludge would not occur provided that several requirements do not permit.

The application of UASB processes for treatment of numerous

kinds of wastewater is now widely used abroad (see Table 3.6). It becomes particularly attractive as an alternative for treating the wastewater of the country in tropical area. From surveyed papers, only 12 full-scale 3000 m^3 UASB reactor have been installed to treat the wastewater from distillery plant of the Surathip Group, in Thailand. Despite the fact that various kind of wastewater can be treated with a high treatment efficiency under temperature range of our country. This may be because we still lack our own experimental data and experiences. Consequently this research studies the feasibility and the performance of the UASB process with the brewery wastewater as feed, and offers guideline for further application of full-scale plants in the near future.

1.2 Objectives

1.2.1 To investigate the feasibility of and the period of time required for cultivating granular sludge in the UASB reactor.

1.2.2 To investigate the treatment capacity of the UASB process with low-strength brewery wastewater under mesophilic temperature.

1.2.3 To investigate the optimal parameter for treating this type of wastewater.

1.3 Scope

The experimental work was carried out with the brewery wastewater in a pilot-plant scale UASB reactor which was set up in

the site of the Boon Rawd Brewery Wastewater Treatment Plant. The brewery wastewater fed under mesophilic temperature between 35°-42°C was screened before being stored in the equalizing tank. The retention time was decreased from 24 to 4 hours. Several parameters analysed were COD_t, COD_f, BOD_5, TKN, TP, TS, SS, VSS, pH, VFA, akalinity, gas production, methane content, and sludge profile.

1.4 Benefit and Application

1.4.1 The UASB process, besides being a simple and cheap treatment process, also has the following advantages : uses no packing material to support, requires low energy input, gets methane gas as a substitution energy, and has low excess sludge yield which eases disposal problems.

1.4.2 The process is simple in construction and uses limiting area required. Moreover,because of its simplicity, so application for further increase in treatment efficiency can be done by installing upper settler compartment on a tank of an existing aerobic treatment plant.

1.4.3 A high concentration of an active granular sludge retained in the reactor is capable to handle high organic loading and fluctuated wastewater which arising in case an accidental spillages of concentrated solution from the production process.

1.4.4 An advantage for granular sludge remained viable in the reactor under a long period of unfed condition, i.e., during the weekend break, is that the process can be out of operation and can be restarted up as soon as wastewater is available.