INTISARI

Pertumbuhan industri susu di Indonesia yang mengalami peningkatan dari tahun ke tahun dapat menjadi sumber potensi bertambahnya limbah yang akan dihasilkan. Limbah lumpur (*sludge*) dari Instalasi Pengolahan Air Limbah (IPAL) industri susu diperkirakan masih mengandung banyak bahan organik. Untuk mengurangi dampak negative dari penumpukan *Sludge* IPAL tersebut, dilakukan pengolahan dengan menggunakan teknologi *hydrothermal*. *Hydrothermal* merupakan salah satu teknologi konversi biomassa yang memanfaatkan suhu dan tekanan tinggi dalam ruang tertutup dengan menggunakan air sebagai pelarut. Penelitian ini bertujuan mempelajari pengaruh suhu, rasio sludge dan air serta jenis katalis terhadap produk cair yang dihasilkan dari proses *hydrothermal*. Penelitian dilakukan dalam suatu reactor *batch* berkapasitas 2L dengan variasi suhu 180, 200, 220^{o}C, rasio slude-air 1:3,1:5, 1:7, katalis zeolite dan $Ca(OH)_2$. Produk cair yang dihasilkan dianalisis kandungan makro nutrient (N,P,K) menggunakan metode Kjedahl untuk N, *High Range Portable Photometer* untuk P dan *Pottasium High Range Portable Photometer* untuk K. Mikro nutrient dalam produk cair dianalisis dengan menggunakan ICP. Berdasarkan penelitian, suhu, rasio dan jenis katalis berpengaruh terhadap konsentrasi makro micro nutrient yang dihasilkan. Konsentrasi nutrient tertinggi didapatkan pada sample Z3-180 yaitu sample dengan suhu operasi 180^{o}C, rasio sludge-air 1:3 dengan katalis zeolite. Jika dibandingkan dengan standard mutu pupuk organik cair, produk cair yang dihasilkan dari proses *hydrothermal sludge* IPAL industri susu memiliki potensi sebagai bahan pupuk cair organik.

Kata kunci: *hydrothermal, sludge,* pupuk cair, pengolahan limbah

ABSTRACT

The growth of the dairy industry in Indonesia, which has increased from year to year, can be a potential source of additional waste that will be generated. It is estimated that sludge from the dairy industry's Wastewater Treatment Plant (WWTP) still contains a lot of organic matter. To reduce the negative impact of the accumulation of WWTP sludge, the processing is carried out using hydrothermal technology. This technology utilizes high temperature and pressure in a closed reactor with the presence of water as a solvent as well as a reactant. This research was aimed to study the effect of temperature, sludge and water ratios, and the type of catalyst on liquid products produced from the hydrothermal process. The research was conducted in a 2 L batch reactor with temperature variations of 180, 200, 220^{o}C, the sludge-water ratio of 1:3, 1:5, 1:7, and catalyst types of zeolite and $Ca(OH)_2$.The liquid product was analyzed for the content of macronutrients (i.e. N, P, K), Phosphate, and Pottasium by using the Kjeldahl method, Phosphate High Range Portable Photometer, and Pottasium High Range Portable Photometer, respectively. The content of micronutrients was analyzed by using Inductively Coupled Plasma (ICP). Based on research, temperature, ratio, and type of catalyst affected the concentration of macro and micro nutrients produced. The highest nutrients was obtained in the sample of Z3-180, which had an operating temperature of 180^{o}C, the sludge-water ratio of 1: 3, and zeolite catalyst. When compared with the standard quality of liquid organic fertilizers, the product resulted from hydrothermal sludge of WWTP had potential application as organic fertilizer.

Key words: hydrothermal, sludge, liquid fertilizer, waste treatment