

Clean Energy Production with Municipal Sewage Sludge – Catalytic Gasification of Refined Sewage Sludge in Medium Temperatures –

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This study purposed that catalytic gasification of agglomerates of sewage sludge with oil-coal mixtures would produce more syngas and reduce concentrations of NH_3 and HCN. A catalytic gasifier consisted of two-stage catalyst beds, and catalysts at the 1st and 2nd stages were CaO and NiO, respectively. Gasification of the agglomerates was performed at 850 °C, and a mixture of N_2 and O_2 with water vapor was introduced into the gasifier. Conversion of the gasification was over 95 % and tar produced during the gasification was less than 3 % at the 1st-stage catalyst bed. The temperature at the 2nd-stage catalyst bed was around 650 °C, where it was possible to increase the fraction of H_2 through the water-gas shift reaction and convert tar-N and HCN to NH_3 . Also, NiO at the 2nd stage catalyst bed could improve the ratio of CO to H_2 from 3:1 to 1:1.4 in the outlet gas. On the other hand, when Fe_2O_3 was used as the 2nd-stage catalyst, the production fraction of NH_3 to HCN was decreased toward 30:1. It was noting that tar produced during the gasification could be reused for replacing oil in the preparation process of the agglomerates. This work was financially supported by the KOSEF and the KEMCO.