

This research was carried out to study the effects of hydraulic retention time (HRT) and organic loading rate on the biogas production from two-stage anaerobic digestion of tomato solid waste. The experiments were performed by using 4-litre reactors and semicontinuous feeding. The tomato solid waste mixed with the acidogenic inoculum into the concentration of 10 g/litre was used as raw material in the acidogenic stage. The results of the study at various HRTs of 3, 5 and 10 days, showed that the organic content, in term of mgCOD/litre, in the filtered liquor increased as HRT, increased. At 10-day HRT the filtered liquor contained the organic and volatile fatty acid contents is the average of 2,303 mgCOD/litre and 1,116 mg/litre, respectively. This filtered liquor was adjusted to pH 7 and used as feed of the methanogenic stage. The methanogenic stage was carried out at various organic loading rates of 0.2, 0.5 and 0.8 gCOD/day and various HRTs of 2, 5 and 10 days. It was found that when increasing the HRTs at a constant organic loading rate, the rate and the efficiency of gas production increased. Moreover, the organic and volatile fatty acid destruction also increased. When increasing the organic loading rates at a constant HRT, the rate of gas production increased, whereas the efficiency of gas production was rather constant. The organic and volatile fatty acid destruction at the organic loading rate of 0.5 gCOD/day was more or less the same as that of 0.8 gCOD/day but higher than that of 0.2 gCOD/day. When the organic loading rate increased up to 1.5 gCOD/day with 5-day HRT. The maximum gas production, with methane content, in the combined gases between carbondioxide and methane, of 90.17% was obtained at the rate of 0.528 litre/day or 0.132 litre/litre/day. The efficiency of gas production

was 0.35 litre/gCOD added or 0.45 litre/gCOD destroyed . The organic destruction was 79.54%

In the study of the intermediates obtained from the first stage and used as raw materials for the methanogenic stage, in the reactors that carried out with the organic loading rates of 0.8, 1.0 and 1.5 gCOD/day and the HRTs of 2 and 5 days, were found to be ethanol , acetic acid, propionic acid and butyric acid. These intermediates were used in the range of 85-100%. The activity of microorganism in using various substates as carbon source for methane production was also studied. It showed that the methane contents produced by the microorganism from each reactors studied using acetic acid (0.1%v/v) and peptone (0.1%w/v) were higher than those using ethaol (0.1%v/v) and glucose (0.1%w/v). Whereas at 1% (w/v) glucose, the gas produced was only carbondioxide.