

Abstract

Biogas produced from municipal solid waste requires proper purification due to the presence of siloxanes and other impurities. Siloxanes are converted to silicon dioxide at the combustion temperature and this forms deposits on the combustion surfaces of the engine components. Thus, to prolong the equipment life, purification is required. This study therefore focused on the determination and removal of siloxane in energy recovery of biogas from municipal solid waste. Air Toxics Method was adopted for sampling and the composition of siloxane and other impurities were determined using gas chromatograph. Two purification filters were developed using transparent plastic container, iron sponge, iron fillings, silica gel, activated carbon made from palm kernel shell and calcium oxide. The biogas produced was divided into sample A, sample B, sample C, and sample D and evaluated before and after purification for the presence of siloxanes and other possible impurities. It was observed that the percentage composition of produced methane increases with continuous anaerobic digestion of substrates while the percentage composition of siloxanes, and other impurities decrease with duration and extent of biomethanation. The results obtained also confirm the presence of siloxanes in the four samples analyzed (0.628 mg/m³ for sample A, 0.638 mg/m³ for sample B, 0.613 mg/m³ for sample C, and 0.625 mg/m³ for sample D). However, after purification, the concentration of siloxane was reduced tremendously (0.628 mg/m³ for sample A, 0.638 mg/m³ for sample B, 0.613 mg/m³ for sample C, and 0.625 mg/m³ for sample D).