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INVESTIGATION OF THERMAL DECOMPOSITION AND GASES RELEASE FROM PRE-DRYING MUNICIPAL SOLID WASTE (PMSW) VIA PYROLYSIS TECHNOLOGY

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Abstract

Present study investigates the thermal decomposition and syngas potential of pre-drying municipal solid waste (PMSW) via pyrolysis using thermo-gravimetric (TGA) analyzer coupled with the mass spectrometer (MS). The experiments were performed at the heating rates 5 and 15°C/min. Differential thermo-gravimetric (DTG) curves exposed four conversion phases at lower heating rate and two conversion phases at higher heating rate. MS analysis of the evolved gases H_2, CO, and CH_4 revealed that the devolatilization phase played a major role during the processes. Higher H_2 generation was observed at a lower heating rate due to more contact among PMSW and process temperature. Higher CO and CH_4 were also favored at lower heating rate. Total yield of gases was found higher due to higher CO generation. For the estimation of activation energy (Ea), Flynn-Wall-Ozawa (FWO) kinetic model was applied at the conversion rates (α) ranged from 5–35. In overall, the lower heating rate supported the higher WMSW conversion as well as higher gas released during the process. Hence, this study will help to evaluate the H_2 potential of the PMSW using pyrolysis thermal technology.

Keywords: **Circular Economy; Municipal Solid Waste; Waste Management; Performance; Sustainability.**