## ABSTRACT

The demand for petroleum-based energy continues to increase, while its availability becomes increasingly limited and prices keep rising. This situation highlights the need to develop alternative, renewable, and environmentally friendly energy sources, one of which is biomass. This study aims to analyze the characteristics, optimal composition, and the effect of compaction pressure on briquettes made from biogas sludge mixed with coconut shell using molasses as a binder. Biogas sludge is a by-product of the biogas production process that has not yet been optimally utilized, while coconut shells have a high calorific value and are abundantly available in the community. Molasses is selected as a natural binder due to its high sugar content and its ability to enhance the strength and quality of briquettes. The briquette production process involves pyrolysis of the raw materials, using a fixed binder composition of 30% and varying the biogas sludge to coconut shell ratios at 80%:20%, 75%:25%, and 70%:30%. In addition, compaction pressures were varied at 55%, 60%, and 65%. The parameters evaluated to assess the briquette characteristics include moisture content, ash content, calorific value, burning rate, density, and bulk density. The results showed that the sample with a biogas sludge to coconut shell composition of 70%:30% and 65% compaction pressure (SBTKM9) vielded the best results in four out of six parameters. SBTKM9 had a moisture content of 6.057%, SBTKM3 had an ash content of 16.5%, SBTKM3 had a calorific value of 3888.29 cal/g, SBTKM9 had a density of 1.083 g/cm<sup>3</sup>, SBTKM9 had a bulk density of 0.441 g/cm<sup>3</sup>, and SBTKM9 had a burning rate of 0.0086 g/s.

Key words: briquettes, molasses, pressing, biogas sludge, coconut shell.