SUMMARY

Biomass gasification represent technology process thermo-kimia with altering various solid type biomass become syn-gas (CO, H₂, CH₄) with supplay an amount of thermal energy. This research target is to get corn cobs biomass characterization as the feeding of gasification process, biomass gasification characterization using reactor downdraft two-stream air with variation of ratio gasifying agent with corn cobs biomass and performance characterization of engine with dual fuel system (syn-gas and biodiesel). Biomass characterization include proximate and ultimate analysis and calculated lower heating value, biomass gasification characterization cover to identify step zone gasification process, identify losses and also calculation of efficiency of thermal of conversion process of biomass become syn-gas and performance characterization of dual fuel system cover to calculation specific fuel consumption, percentage syn-gas replace fossil diesel at mechanism of dual fuel and also the level of temperature of exhaust gas.

Research started from corn cobs biomass characterization in proximate and ultimate analysis and continued with biomass gasification characterization use reactor of gasifier type downdraft. Reaktor gasifier type downdraft selected since its ability for reducing tar composition in syn-gas. Identify step zone of gasification process conducted with installation 5 point of temperature measurement as long as gasifier reactor to get zone drying, pyrolysis, oxidation partial and also reduce. Arrangement of ratio of gasifying agent and rice husk biomass conducted with adjusted of position of dimmer blower, that is position 1, 3, 4, 5, and 6. This matter intended to arrange rotation blower so that mass of flow gasifying agent also change.

Corn cobs biomass characterization yield proximate analysis in the form of moisture: 10.15%, volatile matter: 87.9%, ash: 1.8% and fixed carbon: 0.15%; ultimate analysis in the form of C: 47.6%, H: 5.91%, O: 38.72%, N: 0.84% and S: 0.15% and also lower heating value: 22.66 MJ/KG. Decreasing of ratio of gasifying agent and biomass during gasification process showed tendency of blue fire colour progressively immeasurable highly and increasing the flame temperature. The quality syn-gas on course dimmer I: H₂ = 13.29%, O₂ = 8.51%, N₂ = 57.86%, CO₂ = 8.33%, CO = 10.52%, CH₄ = 1.40% and C₂H₆ = 0.08% and NKB = 2642.88 kJ/kg.

Performance characterization of dual fuel system showed increase specific fuel consumption and temperature exhaust of gas until 11.7% and 28.6%, respectively and also system of dual fuel able to replace 51.6% biodiesel with syn-gas of result of biomass gasification.

Key words: Corn cobs, characterization, gasification, syn-gas, dual fuel and engine performance.