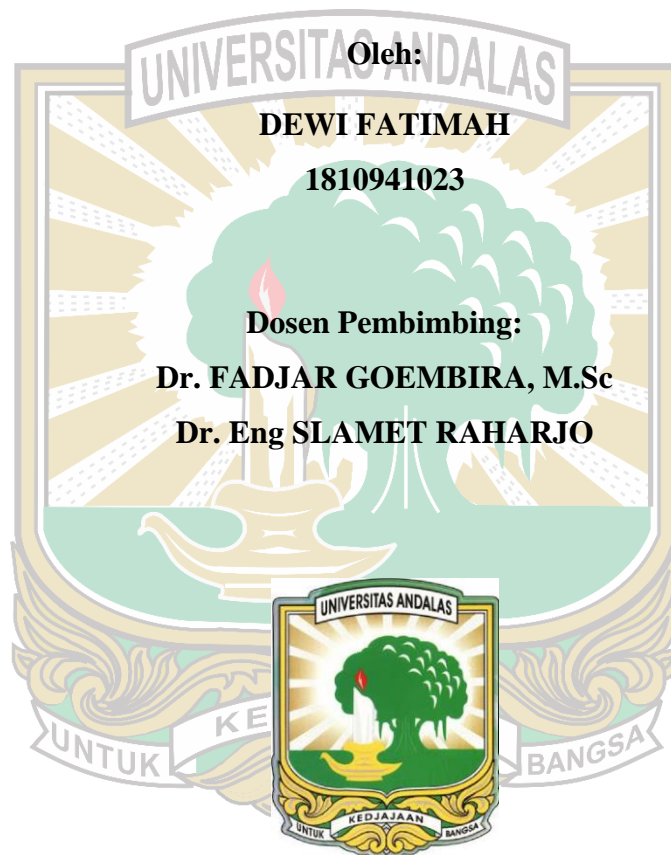


**EVALUASI KONSENTRASI *PARTICULATE MATTER* 2,5,  
KARBON MONOKSIDA, KARBON DIOKSIDA, DAN LAJU  
KONSUMSI BAHAN BAKAR PADA PEMBAKARAN BRIKET  
ARANG BATANG JAGUNG**

**TUGAS AKHIR**

Sebagai salah satu syarat untuk menyelesaikan  
Program Stata-1 pada  
Departemen Teknik Lingkungan  
Fakultas Teknik

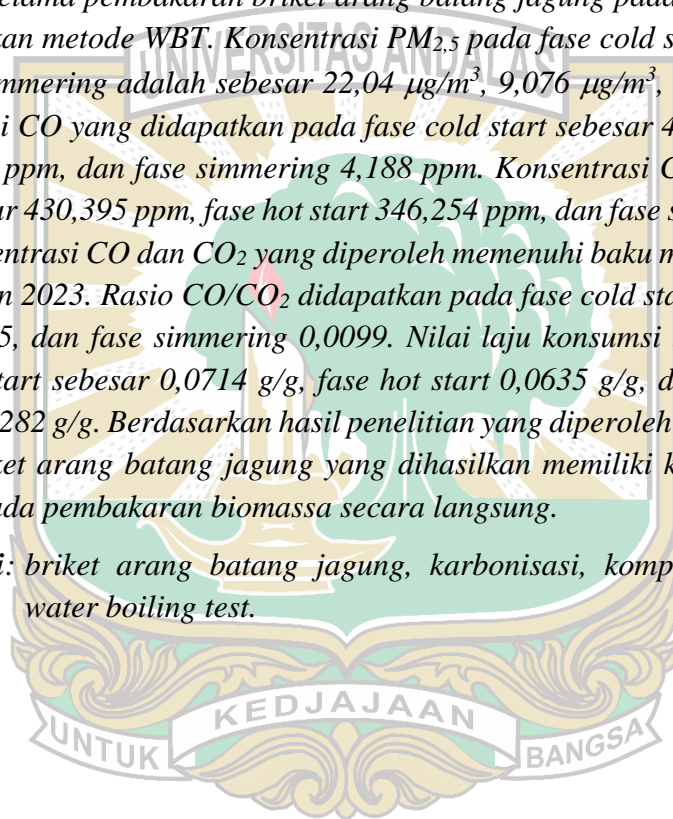


**DEPARTEMEN TEKNIK LINGKUNGAN  
FAKULTAS TEKNIK - UNIVERSITAS ANDALAS  
PADANG  
2023**

## ABSTRAK

Pemanfaatan limbah batang jagung menjadi bahan bakar alternatif merupakan solusi untuk mengurangi permasalahan pemanasan global. Limbah batang jagung diubah menjadi briket dengan cara karbonisasi dengan suhu 250-350°C selama 2 jam. Penelitian ini bertujuan untuk mengevaluasi kualitas briket, konsentrasi  $PM_{2.5}$ , CO, dan  $CO_2$ , mengevaluasi rasio  $CO/CO_2$  dan laju konsumsi bahan bakar briket terhadap baku mutu dan penelitian terkait. Hasil pengujian kualitas briket berupa kadar air, kadar abu, kerapatan, dan nilai kalor telah memenuhi SNI-6235-2000 dan SNI 06-3730-1995, kecuali kadar volatil briket tidak memenuhi baku mutu. Pengukuran konsentrasi  $PM_{2.5}$ , CO,  $CO_2$ , dan laju konsumsi bahan bakar diperoleh selama pembakaran briket arang batang jagung pada kompor biomassa menggunakan metode WBT. Konsentrasi  $PM_{2.5}$  pada fase cold start, fase hot start, dan fase simmering adalah sebesar 22,04  $\mu g/m^3$ , 9,076  $\mu g/m^3$ , dan 26,028  $\mu g/m^3$ . Konsentrasi CO yang didapatkan pada fase cold start sebesar 4,096 ppm, fase hot start 3,271 ppm, dan fase simmering 4,188 ppm. Konsentrasi  $CO_2$  pada fase cold start sebesar 430,395 ppm, fase hot start 346,254 ppm, dan fase simmering 433,699 ppm. Konsentrasi CO dan  $CO_2$  yang diperoleh memenuhi baku mutu PERMENKES No. 2 Tahun 2023. Rasio  $CO/CO_2$  didapatkan pada fase cold start 0,0095, fase hot start 0,0095, dan fase simmering 0,0099. Nilai laju konsumsi bahan bakar pada fase cold start sebesar 0,0714 g/g, fase hot start 0,0635 g/g, dan fase simmering sebesar 0,1282 g/g. Berdasarkan hasil penelitian yang diperoleh dapat disimpulkan bahwa briket arang batang jagung yang dihasilkan memiliki kualitas yang lebih baik daripada pembakaran biomassa secara langsung.

**Kata Kunci:** briket arang batang jagung, karbonisasi, kompor biomassa, dan water boiling test.



## ABSTRACT

*The utilization of corn stalk waste as an alternative fuel is a solution to reduce the problem of global warming. Corn stalk waste is converted into briquettes by carbonization at 250-350°C for 2 hours. This study aims to evaluate the quality of briquettes, concentrations of PM<sub>2.5</sub>, CO, and CO<sub>2</sub>, evaluate the ratio of CO/CO<sub>2</sub> and fuel consumption rate of briquettes against quality standards and related research. The results of testing the quality of the briquettes in terms of moisture content, ash content, density, and calorific value complied with SNI-6235-2000 and SNI 06-3730-1995, except for the volatile matter which still exceeds the quality standards. Measurements of concentrations of PM<sub>2.5</sub>, CO, CO<sub>2</sub>, and fuel consumption rates were obtained during the combustion of corn stalk charcoal briquettes on a biomass stove using the WBT method with three phases, namely the cold start phase, the hot start phase and the simmering phase. PM<sub>2.5</sub> concentrations in the cold start phase, hot start phase, and simmering phase were 22,04 µg/m<sup>3</sup>, 9,076 µg/m<sup>3</sup>, and 26,028 µg/m<sup>3</sup>. The concentration of CO obtained in the cold start phase was 4,096 ppm, the hot start phase was 3,271 ppm, and the simmering phase was 4,188 ppm. The concentration of CO<sub>2</sub> in the cold start phase was 430,395 ppm, the hot start phase was 346,254 ppm, and the simmering phase was 433,699 ppm. The ratio of CO/CO<sub>2</sub> was obtained in the cold start phase of 0,0095, the hot start phase of 0,0095, and the simmering phase of 0,0099. The value of the fuel consumption rate in the cold start phase was 0,0714 g/g, the hot start phase was 0,0635 g/g, and the simmering phase was 0,1282 g/g. Based on the research results obtained, it can be concluded that the corn stalk charcoal briquettes produced have better quality than those produced by direct combustion of biomass.*

**Keywords:** biomass stove, carbonization, corn stalk charcoal briquettes, and water boiling test.

