

**PENINGKATAN NILAI KALORI METANA MELALUI ADSORPSI
KARBON DIOKSIDA DENGAN KOMBINASI ANTARA
ADSORBEN ZEOLITE ALAM DAN ARANG DARI
SLUDGE BIOGAS SAPI**

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INTISARI

Penelitian ini bertujuan untuk mengetahui perbedaan kemampuan adsorpsi biogas pada adsorben zeolite alam dan arang *sludge* biogas dalam mengurangi jumlah presentase karbon dioksida (CO₂) yang terdapat dalam biogas, dan meningkatkan kualitas dan efektifitas biogas setelah dilakukan pemurnian. Penelitian ini menggunakan biogas produksi Pusat Inovasi Agroteknologi (PIAT) untuk diadsorpsi dengan menggunakan adsorben yang dibagi menjadi lima perlakuan dan pengulangan sebanyak 2 kali. Analisis yang digunakan yaitu analisis variansi pola searah. Perlakuan dibedakan lima perlakuan, yaitu 80 gram zeolite alam : 0 gram arang *sludge*, 60 gram zeolite alam : 20 gram arang *sludge*, 40 gram zeolite alam : 40 gram arang *sludge*, 20 gram zeolite alam : 60 gram arang *sludge*, 0 gram zeolite alam : 80 gram arang *sludge*. Variabel yang diteliti yaitu kadar penurunan CO₂, uji suhu akhir, nilai kalor pemanasan air, nilai kalor biogas, dan efisiensi pembakaran. Berdasarkan hasil penelitian diketahui bahwa adsorben 0 gram zeolite : 80 gram arang *sludge* merupakan sampel yang memiliki nilai penurunan presentase CO₂ paling tinggi (13,76%), uji suhu akhir (79,50 ± 1,41°C), nilai kalor pemanasan air (225,13 ± 4,08 KJ), nilai kalor biogas (1480,20 ± 13,32 KJ), dan efisiensi pembakaran (15,21 ± 0,44). Adsorben dengan 0 gram zeolite : 80 gram arang *sludge* menunjukkan perbedaan yang nyata dibandingkan adsorben lainnya (P<0,05). Berdasarkan hasil penelitian ini dapat diambil kesimpulan bahwa sampel adsorben dengan kadar penurunan CO₂, suhu akhir, nilai kalor pemanasan air, nilai kalor biogas, dan efisiensi pembakaran tertinggi yaitu adsorben 0 gram zeolite : 80 gram arang *sludge*.

(Kata kunci: Biogas, Adsorpsi, Zeolite, Arang *Sludge* Biogas, Nilai Kalor)

IMPROVEMENT OF METANA CALORIE VALUE THROUGH ADSORPTION OF CARBON DIOXIDE WITH COMBINATION BETWEEN ADSORBENT ZEOLITE NATURAL AND CHARCOAL FROM SLUDGE BIOGAS COW

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ABSTRACT

This research was to determine the differences in the ability of biogas adsorption on natural zeolite adsorbent and biogas *sludge* charcoal to reduce the percentage of carbon dioxide (CO₂) contained in biogas, and improve the quality and effectiveness of biogas after purification. This research used biogas produced at Pusat Inovasi Agroteknologi (PIAT) to be adsorbed using adsorbent which is divided into five type with 2 times repetitions. Analysis used for this research was One Way ANOVA. Treatment is divided into five treatment 80 gram natural zeolite : 0 gram *sludge* charcoal, 60 gram natural zeolite : 20 gram *sludge* charcoal, 40 gram natural zeolite : 40 gram *sludge* charcoal, 20 gram natural zeolite : 60 gram *sludge* charcoal, 0 gram natural zeolite : 80 gram *sludge* charcoal. The variables study were the levels of CO₂ reduction, test final temperature, heating value of water, biogas calorific value, and combustion efficiency. The results of the study, it was found that the adsorbent was 0 gram natural zeolite : 80 gram *sludge* charcoal was the sample that had the highest value of CO₂ reduction (13,76%), test final temperature (79,50 ± 1,41°C), heating value of water heating (225,13 ± 4,08 KJ), biogas heating value (1480,20 ± 13,32 KJ), and combustion efficiency (15,21 ± 0,44). Adsorbent with 0 gram natural zeolite : 80 gram *sludge* charcoal showed a significant differences compared to other adsorbent (P <0.05). Based on the research of it can be concluded that the adsorbent samples with levels of CO₂ decrease, final temperature, heating water value, biogas calorific value, and highest combustion efficiency is 0 gram natural zeolite: 80 gram *sludge* charcoal.

(Keywords: Biogas, Adsorption, Zeolite, Charcoal *Sludge* Biogas, Calorific Value)