

EFEKTIVITAS PENURUNAN KARBON DIOKSIDA (CO₂) SERTA EFISIENSI PEMBAKARAN BIOGAS DENGAN METODE ABSORPSI MENGGUNAKAN LARUTAN NATRIUM HIDROKSIDA (NaOH)

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INTISARI

Penelitian ini bertujuan untuk mengetahui efektivitas Natrium Hidroksida (NaOH) dalam mengurangi persentase karbon dioksida (CO₂) yang terdapat dalam biogas untuk meningkatkan kualitas biogas tersebut serta tingkat efektifitas pembakaran biogas yang terjadi setelah proses absorpsi. Penelitian ini menggunakan biogas yang ada di Pusat Inovasi Agroteknologi (PIAT) untuk diadsorpsi dengan menggunakan adsorben yang dibagi menjadi empat perlakuan dengan pengulangan sebanyak dua kali. Analisis yang digunakan yaitu analisis variansi pola searah. Perlakuan dibedakan atas 4 perlakuan, yaitu perlakuan NaOH dengan kadar 5%, 15%, 25% dan 35%. Variabel yang diteliti yaitu persentase penurunan CO₂ pada perlakuan larutan NaOH 5%, 15%, 25% serta 35% berturut-turut masing-masing adalah 17,09%, 19,68%, 25,09%, dan 52,11%. Perlakuan larutan NaOH 35% merupakan sampel dengan nilai penurunan persentase CO₂ paling tinggi dengan nilai penurunan sebesar 52,11%. Hasil penelitian pada uji pemanasan air pada perlakuan larutan NaOH 5%, 15%, 25% serta 35% berturut-turut masing-masing adalah (187,91 ± 10,041 kJ), (225,42 ± 1,775 kJ), (227,91 ± 8,471 kJ), dan (243,82 ± 1,916 kJ). Perlakuan larutan 35% tidak menunjukkan perbedaan yang nyata dibandingkan perlakuan larutan 15% dan 25%, tetapi menunjukkan perbedaan nyata dibandingkan perlakuan larutan 5% (P<0,05). Hasil penelitian pada nilai kalor biogas pada perlakuan larutan 15% berturut-turut masing-masing adalah (1071,73 ± 33,98 kJ), (1199,53 ± 9,928 kJ), (1253,4 ± 28,426 kJ), dan (1328,1 ± 8,980 kJ). Efisiensi pembakaran pada perlakuan larutan NaOH 5%, 15%, 25% serta 35% berturut-turut masing-masing adalah (17,435 ± 0,178%), (18,780 ± 0,0622%), (19,010 ± 0,636%), dan (19,925 ± 1,209%). perlakuan larutan NaOH 35% menunjukkan perbedaan yang nyata dibandingkan adsorben lainnya (P<0,05). Berdasarkan penelitian, disimpulkan bahwa penurunan persentase CO₂, kalor biogas dan efisiensi pembakaran tertinggi yaitu pada perlakuan larutan NaOH 35%.

Kata kunci: Absorpsi, Biogas, NaOH, CO₂, Efisiensi Pembakaran

EFFECTIVENESS OF DECREASING CARBON DIOXIDE (CO₂) AND BIOGAS COMBUSTION EFFICIENCY USING ABSORPTION WITH SODIUM HYDROXIDE (NaOH) SOLUTION

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ABSTRACT

This research was aimed to determine the effectiveness of sodium hydroxyde (NaOH) in reducing percentage of carbon dioxide (CO₂) contained in biogas to improve the quality of the biogas and the effectiveness of biogas combustion that occurs after the absorption process.in the biogas. This research used existing biogas at Pusat Inovasi Agroteknologi (PIAT) to be adsorped by using adsorbent which is divided into four types with two times repetitions. Analysis used for this research was One Way ANOVA. There were 4 types of sample, that were 5%, 15%, 25% and 35% NaOH solution treatments. The result from the research showed that decrease of CO₂ at 5%, 15%, 25% and 35% NaOH solution treatments respectively 17,09%, -19,68%, -25,09%, dan -52,11%. It shows that 35% NaOH solution treatment was the sample with the highest value of the percentage reduction of CO₂, it was -52,11%. The result from water heating test at %, 15%, 25% and 35% NaOH solution treatments respectively (187,91 ± 10,041 kJ), (225,42 ± 1,775 kJ), (227,91 ± 8,471 kJ), and (243,82 ± 1,916 kJ). Sample of 35% NaOH solution treatment doesn't showed significant difference compared to 15% and 25% NaOH solution treatments, but it showed a significant difference compared to 5% NaOH solution treatment (P<0,05). The result from biogas heat value at 5%, 15%, 25% and 35% NaOH solution treatments respectively are (1071,73 ± 33,98 kJ), (1199,53 ± 9,928 kJ), (1253,4 ± 28,426 kJ), dan (1328,1 ± 8,980 kJ). Combustion efficiency value at NaOH solution treatments respectively are (17,435 ± 0,178%), (18,780 ± 0,0622%), (19,010 ± 0,636%), dan (19,925 ± 1,209%). Sample 35% NaOH solution treatment showed a significant difference compared to other samples (P<0,05). Based on the research, it was concluded that the reduction in the percentage of CO₂, biogas heat and the highest combustion efficiency was in the 35% NaOH solution treatment.

Keywords : Absorption, Biogas, NaOH, Burning Efficiency