Document Viewer

Turnitin Originality Report

Processed on: 19-Oct-2021 08:28 WIB
ID: 1677618742
Word Count: 2981
Submitted: 1

Performance of 100 CC Combustion Engine With ... By Sujita Darmo

Similarity Index	Similarity by Source	
18%	Internet Sources:	13%
	Publications:	4%
	Student Papers:	10%

include quoted include bibliography excluding matches < 1% mode: quickview (classic) report Change mode
print refresh download

3% match (Internet from 04-Oct-2021)
https://www.jimsindia.org/FacultyProfile.aspx?FacultyName=DrAmishaGupta

3% match (Internet from 08-Aug-2021)
https://eprints.ugd.edu.mk/28062/1/Characterization%20of%20Resveratrol%20Loaded%20Nanoparticles%20A%20Review.pdf

2% match (Internet from 06-Sep-2021)
https://123dok.com/document/zwrerk7y-adsorbsi-karbon-dioksida-dalam-biogas-dengan-menggunakan-endapan.html

2% match (student papers from 26-May-2020)
Submitted to Universitas Brawijaya on 2020-05-26

1% match (Internet from 21-Apr-2020)
https://www.neliti.com/publications/129849/purifikasi-biogas-dengan-variasi-ukuran-dan-massa-zeolit-terhadap-kandungan-ch4

1% match (publications)
A Rosyidin, Y Effendi, Efrizal, Amir. " Comparative analysis combustion chamber cleaners use carbon cleaner on performance 16 3SZ-VE IL,-4 cylinder valve, DOHC,VVT-i, ", Journal of Physics: Conference Series, 2020

1% match (student papers from 12-Mar-2016)
Submitted to University of Liverpool on 2016-03-12

1% match (Internet from 20-Mar-2017)
http://portalgaruda.ilkom.unsri.ac.id

1% match (student papers from 22-Sep-2019)
Submitted to Sriwijaya University on 2019-09-22

1% match (publications)
P. Mullai, S. Vishali, M.K. Yogeswari, M. Estefanía López, Eldon R. Rene. "Methane production and recovery from wastewater", Elsevier BV, 2020

1% match (Internet from 04-Feb-2017)
https://shareok.org/bitstream/handle/11244/11285/Thesis-2002-K88m.pdf?isAllowed=y&sequence=1

1% match (publications)
C. Sayin. "Energy and exergy analyses of a gasoline engine", International Journal of Energy Research, 03/10/2007

1% match (student papers from 20-Jan-2014)
Submitted to Swansea Metropolitan University on 2014-01-20

1% match (Internet from 05-Oct-2021)
http://www.eprints.unram.ac.id

Performance of 100 CC Combustion Engine With Refined Biogas Fuel With Coconut Ash as Adsorbent Rudy Sutanto1, Sujita2 1,2 Department of Mechaical Engineering, Faculty of Engineering, Mataram University, Mataram, Indonesia. -- --- Submitted: 15-04-2021 Revised: 28-04-2021 Accepted: 30-04-2021 --- ABSTRACT: Biogas is an alternative energy that can be a cheap and environmentally friendly alternative to fuel oil. The composition of biogas is CH4, CO2, N2, H2, O2, and H2S. CH4 gas is the main element in biogas which has a high heating value. In addition to the CH4 gas which is very necessary, there is also a CO2 content which can actually disturb or damage it. If this element is present in biogas, it will interfere with the combustion process itself. Therefore, efforts are needed to reduce CO2 levels which are expected to increase the quality of biogas. The research was conducted to reduce CO2 levels in biogas by using coconut shell ash adsorbent. The method used in this research is pure research by taking into account the variation of the biogas flow rate (2, 4, 6, 8 and 10 lt / min) that passes through the adsorbent. Furthermore, biogas is obtained after purification there are 5 biogas (AB2, AB4, AB6, AB8 and AB10). The research was continued by examining the effect of CO2 biogas on the performance of the combustion engine, seen from the engine speed (1500, 2500, 3500 and 4500 rpm). CO2 gas does not react with coconut shell ash and CH4 gas does not react either. Coconut shell ash only absorbs water vapor contained in biogas. The increase in CO2 gas levels and CH4 gas levels is more due to reduced water content in the biogas so that the percentage of CO2 and CH4 volume changes by the percentage of water volume that can be absorbed by coconut shell ash. Changes in the composition of the content between methane gas and carbon dioxide gas did not show a significant effect on the torque generated by the engine at low speed, namely 1500 and 2500 rpm. At 3500 and 4500 rpm engine speeds indicate an increase in torque for the use of all variations of biogas fuels. The biogas obtained from the purification process

shows that the greater the rate of biogas purification, the greater the torque produced when the fuel is used to drive the engine at 3500 and 4500 rpm engine speed. KEYWORDS: biogas, coconut shell ash, biogas content, engine torque I. INTRODUCTION One of the constraints to development in small islands is the availability of electricity, because this electrical energy really supports the development of the economy in this area, one of which is in supporting the development of ice and coldstrogae factories. Due to the increasing scarcity of petroleum energy sources and the increasing price of world crude oil, this is the main obstacle for PLN in distributing electricity in the region. So this requires a thorough research on the use of environmentally friendly alternative energy to fuel electricity generators, and a very important consideration is the use of natural resources in the small island area as an alternative energy source to be developed. One of the alternative energies that is currently being developed is energy derived from organic materials, this is because these organic compounds are classified as renewable energy. The existence of these organic materials is easy to obtain and their continuity is guaranteed, besides that, the most important thing is that these organic materials are environmentally friendly. This is the main factor in the existence of organic materials which are considered as future energy in the context of realizing green technology. Biogas is a product of green technology that is currently being developed. This is because the gas produced from biological processes (anaerobic digester) is capable of producing gases such as CH_4, CO_2, H_2S, H_2O and other gases. In this case, of course, what is used is methane gas (CH_4), because CH_4 has a heating value that can be used as fuel. Microbiological degradation of organic materials in anaerobic environments can only be carried out by microorganisms capable of utilizing molecules other than oxygen as hydrogen acceptors. Anaerobic decomposition produces biogas consisting of methane (50 - 70%), carbon dioxide (25-45%) and small amounts of hydrogen, nitrogen, hydrogen sulfide. The purity of CH_4 produced from biogas is a very important consideration, because it affects the calorific value / heat produced. So that the CH_4 produced needs to be purified against other impurities. The impurity that affects the calorific value / heat is CO_2, the presence of CO_2 in CH_4 gas is very undesirable, because the higher the CO_2 level in CH_4, the lower the calorific value of CH_4 and very disturbing in the combustion process. This causes the purity of CH_4 to be low. [1]. Purification of biogas from H_2S gas with absorbents used were NaOH, $CuSO_4$, and $Fe_2(SO_4)_3$ with the highest H_2S removal efficiency from each absorbent of 96.32%, 87.19%, and 78.05%. However, it is not recommended to use NaOH and $CuSO_4$ on a large scale, because they cannot be regenerated. [2] Purification of biogas from hospital wastewater treatment using activated carbon of various sizes and flow times, with the best results is the 14 mesh adsorbent can absorb 368.65 mg H_2S in 90 minutes. [3] The use of stratified purification method with NaOH solution with the first purification zeolite and activated charcoal in the second purification. In this study focused on the observation of asan zeolite adsorbent, the size of fine and coarse zeolite, and the mass variations of zeolite were 50 grams, 100 grams and 150 grams. Within 60 minutes, the best results were obtained with a good zeolite size with a mass of 150 grams of CO_2 which decreased to 4.07%, but the pressure dropped to 0.65 kPa. With a coarse zeolite size of4.26% CO_2, with a pressure drop of 0.84 kPa. [4] CO_2 gas in biogas needs to be removed because this gas can reduce the heating value of biogas combustion. In addition, the content of carbon dioxide gas (CO_2) in biogas is quite large, namely around 30-45%, so that the heating value of biogas combustion will be significantly reduced. The heating value of burning pure methane gas at a pressure of 1 atm and a temperature of 15.5oC is 9,100 Kcal/m3 (12,740 Kcal/kg). While the heating value of biogas combustion is around 4,800 - 6,900 Kcal/m3 (6,720 – 9,660 Kcal/kg). [5] Purification of biogas using a solution of $Ca(OH)_2$, biogas purification is carried out using variations in absorbent concentrations, namely 0.1, 1.5, and 2.5 M. area, whereas before it was purified there was methane gas in the amount of 82.46% of the area. [6] The process of refining and pressurized packaging of biogas and its application in the process of generating electrical energy and substituting fossil fuels. It shows that the biogas purification results are close to 100% CH_4 with an efficiency level of electricity and combustion in car engines reaching 97%. [7] The process of reducing CO_2 levels contained in biogas using $Ca(OH)_2$ media or limestone deposits, then reacted with CO_2 to form $CaCO_3$ and H_2O. Meanwhile, the variables to be studied were the effect of the biogas flow rate on the absorbed CO_2 and the resulting CH_4. CO_2 absorption is carried out by passing biogas with various flow rates into $Ca(OH)_2$ at certain concentrations. Gas and $Ca(OH)_2$ will contact each other and a chemical reaction occurs. In every 2 minute interval, the gas that comes out of the absorber is detected by a biogas tester to analyze the absorbed CO_2 and the resulting CH_4. Furthermore, the test was carried out on the performance of the combustion motor with various variations of engine speed, from the analysis it was found that the average CO_2 gas could be absorbed at all variations of the biogas flow rate (5 lt/minute. 10 lt/minute and 15 lt/minute). Meanwhile, the most CH_4 produced was at a biogas flow rate of 10 lt/minute, namely 91% followed by a flow rate of 5 lt/minute which was 76.2% and a flow rate of 15 lt/minute which was 72%. Meanwhile, the most economical use of biogas was found in the purification of variation 2, which was an average of 0.235 kg / hour. The largest increase in effective power was obtained in variation 2 with an increase in the average effective power against unrefined biogas by 20.7%, while the biogas with purification variation 2 obtained a decrease in average SFCE against unrefined biogas by 32.3%. [8] Purification of the biogas from CO_2 using activated carbon from palm kernel shells compared to commercial activated carbon. Increased CH_4 levels by 7% and decreased CO_2 levels by 6.1% using activated carbon from oil palm shells, while commercial activated carbon increased CH_4 levels by 11.5% and decreased CO_2 levels by 12.9%. II. RESEARCH METHODS The research method that will be used to achieve the research objective is to test engine performance, namely to determine the effect of CO_2 in biogas on the performance of the combustion motor, seen from the engine speed (1500, 2500, 3500 and 4500 rpm) and the smoothness of engine speed, this stage is carried out energy conversion laboratory. The main material needed in this research is biomass from cow dung, then mix cow dung and water with a ratio of 1: 1, stirring until dissolved. The mixture is put into a storage tank (digester). Then all the ducts and holes are closed so that no air can enter the system. Furthermore, the mixture of manure and water is left to stand for ± 2 - 3 weeks to form biogas. The research was continued by testing the biogas fuel in the performance of the combustion motor, seen from the engine speed (1500, 2500, 3500 and 4500 rpm) and the smoothness of the engine speed (braking force, fuel consumption). The variables recorded were the magnitude of the braking force and the fuel consumption for two minutes. The test is carried out on the engine by injecting biogas through the intake manifold using a conversion kit, while the carburetor here only functions to regulate the air supply into the combustion chamber. While the variables selected include: fixed variables: Biogas composition consisting of a mixture of CH_4 gases, CO_2, H_2S, H_2O and others, Operating temperature (Top): At room temperature (30oC). As well as for variable changes: engine speed: 1500, 2500, 3500 and 4500 rpm. The series of engine performance testing tools are as follows, Engine performance testing tools, 1. Manual valve, 2. Regulatory valve, 3. Throttle valve, 4. Gas regulator on the engine, 5. Intake manifold, 6. Purified biogas in a tube III. RESULTS AND DISCUSSION The measurement of engine torque can be done by applying a brake to the engine shaft which is connected to L braking or loading. The loading is continued until the engine shaft almost stops rotating. The maximum load read is the braking force which is equal to the rotating force of the engine shaft. Torque is a measure of an engine's ability to do work, so torque is energy. The quantity of torque is a derivative quantity that is commonly used to calculate the energy produced from a rotating object on its axis. The torque value released by the test combustion motor can be determined by multiplying the braking force, the length of the torque gauge arm and the torque correction factor from the data that has been previously obtained. 25 Ori AB2 AB4 AB6 AB8 AB10 20 15 Torque (Nm) 10 5 0 0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 Engine speed (RPM) Figure 1. The relationship between engine speed and torque The relationship between engine speed and torque shown in Figure 1 shows that the torque generated by the engine increases with increasing engine speed. this situation arises as a result of the braking force used to counter the centrifugal force of the engine shaft rotating force is getting bigger along with the increasing changes in engine speed. Effective Power (Watt) 10000 9000 8000 7000 6000 5000 4000 3000 2000 1000 0 0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 Engine Speed (RPM) Ori AB2 AB4 AB6 AB8 AB10 Figure 2. The relationship between engine speed and effective power In the graph of the relationship between engine speed and effective power (Figure 2), it can be seen that the effective power generated by the engine increases with increasing engine speed, this happens because the higher the engine speed, the greater the torque that occurs. While the effective power has a close relationship with torque, if the torque is multiplied by the crankshaft rotation (engine speed), the shaft power or effective power will be obtained. So that if the torque of an engine increases in size, it will indirectly be followed by an increase in the effective power that occurs. Volume 3, Issue 4 Apr. 2021, pp: 608-613 www.ijaem.net ISSN: 2395-5252 0.60 0.50 SFCE (liter/jam.wattt) 0.40 0.30 0.20 Ori AB2 AB4 AB6 AB8 AB10 0.10 0.00 0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 Engine Speed (RPM) Figure 3. The relationship between engine speed and specific fuel consumption is effective In the Figure of the relationship between effective power. As for the fuel consumption, it will engine speed and SFCE shown in Figure 3, it can be increase along with the increase in engine speed seen that the effective specific fuel consumption (Figure 4), this shows that the higher the engine required by the engine decreases with increasing speed of a motor fuel, the greater the fuel engine speed, this happens because at higher engine consumption, even though the fuel consumption speed, the fuel consumption is used per hour to increases but is also followed by an increase in shaft produce less and less per kW of shaft power or power or effective power. . 1200 Fuel Consumption (liter/jam) 1000 800 600 400 200 Ori AB2 AB4 AB6 AB8 AB10 0 Figure 4. The relationship between engine speed and fuel consumption 0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 Engine Speed (RPM) IV. CONCLUSION Changes in the composition of the content between methane gas and carbon dioxide gas did not show a significant effect on the torque generated by the engine at low speed, namely 1500 and 2500 rpm. At 3500 and 4500 rpm engine speeds indicate an increase in torque for the use of all variations of biogas fuels. The biogas obtained from the purification process shows that the greater the rate of biogas purification, the greater the torque produced when the fuel is used to drive the engine at 3500 and 4500 rpm engine speed. While the effective power has a close relationship with torque, if the torque is multiplied by the crankshaft rotation (engine speed), the shaft power or effective power will be obtained. So that if the torque of an engine increases in size, it will indirectly be followed by an increase in the effective power that occurs. REFERENCES [1] Aditya, Kusuma, Pricilia Melisa, dan Agus Hadiyarto, 2012, “Pemurnian Biogasdari Kandungan Hidrogen Sulfida (H2S) dengan NaOH, CuSO4, Fe2(SO4)3 dalam Packed Column Secara Kontinyu,” Jurnal Teknologi Kimia dan Industri Vol. 1 No. 1 Hal.389-395. [2] Alwathan, Mustafa, dan Ramli Thahir, 2013,” Pengurangan Kadar H2S dari Biogas Limbah Cair Rumah Sakit dengan Metode Adsorpsi,” Jurnal Konversi Vol. 2 No. 1 hal.1-6. [3] Denny Widhiyanuriyawan, Nurkholis Hamidi, Candra Trimandoko, 2014, “Purifikasi Biogas dengan Variasi Ukuran dan Massa Zeolit terhadap Kandungan CH4 dan CO2,” Jurnal Rekayasa Mesin Vol.5, No.3 Tahun 2014, pp. 27-32. [4] Harasimowicz, M., P. Orluk , G. Zakrzewska-Trznadel and A.G. Chmielewski, 2007, “Application of Polyimide Membranes for Biogas Purification and Enrichment,” Journal of Hazardous Materials, vol. 144, pp. 698 – 702. [5] Naqiibatin Nadliriyah dan Triwikantoro, 2014, “Pemurnian Produk Biogas Dengan Metode Absorbsi Menggunakan Larutan Ca(OH)2,” Jurnal Sains dan Seni POMITS vol 3 no 2, 2014, pp.107-111. [6] Ofori dan Kwofie, 2009,” Water Scrubbing: A Betterr option for purification and Biogas storage,” Journal World Applied Science (Special issue for Environment), 122-125 [7] Rudy sutanto dan Arif Mulyanto, 2012, “Pengembangan Energi Terbarukan Dengan Optimalisasi Pemanfaatan Biogas Sebagai Sumber Energi Penggerak Generator Listrik Berbasis Absorbsi Gas Carbondioksida,” Laporan Akhir Penelitian Hibah STRANAS DIKTI. [8] Widyastuti, Apria, Berlian Sitorus, dan Afghani Jayuska, 2013,” Karbon Aktifdari Limbah Cangkang Sawit

sebagai Adsorben Gas dalam Biogas Hasil Fermentasi Anaerobik Sampah Organik," JKK Vo. 2 (1) hal.30-33. International Journal of Advances in Engineering and Management (IJAEM) Volume 3, Issue 4 Apr. 2021, pp: 608-613 www.ijaem.net ISSN: 2395-5252 International Journal of Advances in Engineering and Management (IJAEM) Volume 3, Issue 4 Apr. 2021, pp: 608-613 www.ijaem.net ISSN: 2395-5252 International Journal of Advances in Engineering and Management (IJAEM) Volume 3, Issue 4 Apr. 2021, pp: 608-613 www.ijaem.net ISSN: 2395-5252 International Journal of Advances in Engineering and Management (IJAEM) Volume 3, Issue 4 Apr. 2021, pp: 608-613 www.ijaem.net ISSN: 2395-5252 International Journal of Advances in Engineering and Management (IJAEM) International Journal of Advances in Engineering and Management (IJAEM) Volume 3, Issue 4 Apr. 2021, pp: 608-613 www.ijaem.net ISSN: 2395-5252 DOI: 10.35629/5252-0304608613 Impact Factor value 7.429 | ISO 9001: 2008 Certified Journal Page 608 DOI: 10.35629/5252-0304608613 Impact Factor value 7.429 | ISO 9001: 2008 Certified Journal Page 609 DOI: 10.35629/5252-0304608613 Impact Factor value 7.429 | ISO 9001: 2008 Certified Journal Page 610 DOI: 10.35629/5252-0304608613 Impact Factor value 7.429 | ISO 9001: 2008 Certified Journal Page 611 DOI: 10.35629/5252-0304608613 Impact Factor value 7.429 | ISO 9001: 2008 Certified Journal Page 612 DOI: 10.35629/5252-0304608613 Impact Factor value 7.429 | ISO 9001: 2008 Certified Journal Page 613