

ABSTRAK**PENGGUNAAN BENTONIT YANG DIAKTIVASI SECARA FISIK
MENGUNAKAN *MICROWAVE* ATAU OVEN UNTUK
MENINGKATKAN PRESTASI MESIN SERTA MEREDUKSI EMISI GAS
BUANG MESIN BENSIN 4 LANGKAH *TECQUIPMENT* TD201****Oleh****Daud Yosua Aruan**

Menurut Badan Pusat Statistik (BPS) pada tahun 2021 penambahan kendaraan bermotor sebanyak 120.042.298 unit meningkat sebesar 4,1 persen dari tahun sebelumnya. Menanggapi permasalahan tersebut, salah satu cara penghematan bahan bakar dapat dicapai dengan meningkatkan prestasi mesin menggunakan *filter* udara yang terbuat dari bentonit. *Filter* udara yang terbuat dari bentonit memiliki kemampuan menyerap uap air (H_2O) dan nitrogen (N_2) yang terkandung dalam udara pembakaran. Penggunaan filter bentonit dapat memberikan udara yang kaya oksigen yang masuk ke ruang bakar untuk meningkatkan kualitas dari proses pembakaran. Dalam penelitian ini, *filter* dibuat dari bentonit konsentrasi 70% dan air 30%, yang diaktivasi fisik pemanasan menggunakan microwave, dan pada berbagai massa 25 gram, 50 gram, dan 100 gram. Pengujian dilakukan menggunakan mesin bensin 4-langkah Tequipment TD201 yang berlokasi di Laboratorium Motor Bakar dan Propulsi Jurusan Teknik Mesin Universitas Lampung. Berdasarkan pengujian, diperoleh bahwa *filter* udara bentonit yang diaktivasi microwave dapat meningkatkan prestasi mesin. Hasil pengujian menunjukkan bahwa peningkatan daya engkol terbaik terjadi pada penggunaan massa 100 gram dengan temperatur aktivasi $65^{\circ}C$, diperoleh sebesar 9,80%, diikuti terbaik kedua terjadi pada massa 100 gram temperatur aktivasi $77^{\circ}C$ sebesar 9,29%, dan terbaik ketiga terjadi pada massa 25 gram temperatur aktivasi $77^{\circ}C$ sebesar 4,73%. Sementara itu, emisi gas buang mengalami penurunan terbaik terjadi pada putaran mesin 1500 rpm, massa 100 gram temperatur aktivasi $65^{\circ}C$, mampu menurunkan kadar CO sebesar 8% (mereduksi sebesar 54,55%), dapat menurunkan kadar HC sebesar 10 ppm (mereduksi sebesar 33,33%), dapat menurunkan kadar CO_2 sebesar 18% (mereduksi sebesar 40,00%).

Kata kunci : *filter* udara, adsorben bentonit, prestasi mesin, emisi.

ABSTRACT***THE EFFECT OF PHYSICAL ACTIVATED BENTONITE USING A MICROWAVE OR OVEN TO INCREASE ENGINE PERFORMANCE AND REDUCE EXHAUST GAS EMISSIONS OF 4-STEPS GASOLINE ENGINE TECQUIPMENT TD201******By*****Daud Yosua Aruan**

According to the Central Statistics Agency (BPS), in 2021 the addition of motorized vehicles was 120,042,298 units, an increase of 4.1 percent from the previous year. In response to this problem, one way to save fuel can be achieved by improving engine performance using an air filter made from bentonite. Air filters made from bentonite have the ability to absorb water vapor (H₂O) and nitrogen (N₂) contained in combustion air. The use of a bentonite filter can provide oxygen-rich air into the combustion chamber to improve the quality of the combustion process. In this research, filters were made from 70% bentonite and 30% water, which were activated by physical heating using a microwave, and at various masses of 25 grams, 50 grams and 100 grams. Tests were carried out using a Tequipment TD201 4-stroke petrol engine located at the Combustion Motor and Propulsion Laboratory, Department of Mechanical Engineering, University of Lampung. Based on testing, it was found that microwave-activated bentonite air filters can improve engine performance. The test results showed that the best increase in cranking power occurred when using a mass of 100 grams with an activation temperature of 65°C, which was obtained at 9.80%, followed by the second best occurring at a mass of 100 grams with an activation temperature of 77°C at 9.29%, and the third best occurring at mass of 25 grams, activation temperature of 77°C is 4.73%. Meanwhile, the best reduction in exhaust emissions occurred at an engine speed of 1500 rpm, a mass of 100 grams, an activation temperature of 65°C, capable of reducing CO levels by 8% (reducing by 54.55%), able to reduce HC levels by 10 ppm (reducing by 33.33%), can reduce CO₂ levels by 18% (reducing by 40.00%).

Keywords: air filter, bentonite adsorbent, engine performance, emissions.