

ABSTRACT

THE EFFECT OF USING ACID-PHYSICAL ZEOLITE PELLET WITH HIGH NORMALITY ON PERFORMANCE OF A 4-STROKES DIESEL ENGINE

By

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Nowadays, one of the solutions to save fuel is to maximize the air in the combustion process. Natural zeolite that is physically and chemically activated is capable to filter nitrogen and water vapor so that only pure oxygen that come into the combustion chamber in order to make a complete combustion. The increase of the concentration on chemical activation may affect the adsorption ability of the zeolite. Higher concentration of acid used results the wider specific surface area of zeolite pores and makes the zeolite become active. This research aims to observe the effect of using zeolite pellets as adsorbent to increase the performance of a 4-strokes diesel engine.

This research was tested in high normality variation of activator, HCl and H₂SO₄, with the concentration of 1N, 2N, 3N, and 4N, and physical activation at 200 °C for 1 hour. The tests were conducted in dense and distant zeolite arrangement variations of a 4-strokes diesel engines. The engine was operated at low speed (1500 rpm), medium speed (2000 rpm), and high speed (2500 and 3000 rpm). The pellets were put on a frame of filter. Then, that frame was placed on the air filter of the engine so that before the air came into the combustion chamber, it firstly contacted with the zeolite pellets.

The results showed that the pellet activated using HCl at 1N increased the brake power of 2.303% and decreased brake specific fuel consumption of 3.151% in the medium speed. While, the use of zeolite pellets activated using H₂SO₄ with 1N concentration increased the brake power of 2,157% and decreased brake specific fuel consumption of 2.867%. The use of HCl-physical zeolite was better compared to the one that was activated using H₂SO₄ although the difference was not significant. Which were, the average increase of the brake power of 2,063% using HCl and of 1.958% using H₂SO₄. The average decrease of the fuel consumption of 3.308% HCl and of 3.125% for H₂SO₄.

Keywords: Zeolite acid activation, high normality acid, zeolite filter.