

ABSTRACT

USE OF ZEOLITE OF CHEMICAL (H₂SO₄ and HCl) – PHYSICAL ACTIVATION AT VARIOUS NORMALITY IN IMPROVING ENGINE PERFORMANCE AND REDUCE EXHAUST EMISSION OF A 4 – STROKE PETROL MOTORCYCLE

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Increase of fuel consumption at present, is caused by the growth of motor vehicles increase. An effort to use the vehicle without using fuel has not been greatly done. So, it is required efforts to save fuel, such as use of zeolite as adsorben. The performance of zeolite as adsorben can be enchanced by activating zeolite using chemical – physical activation.

Chemical activation was done at various normality. Activator mass was first calculated in order to find required normality. The activator was then added with water. Zeolite was blended into water activator solution with ratio 1 : 7, in which 1 kg zeolite was aged in 7000 ml activator solution. The aging of zeolite was done for 1 hour, after that it was stirred for 45 minutes. The solution was then separated from activated zeolite. Chemical activated zeolite was then washed with water to neutralize until pH 7. After this, the zeolite was physical activated in an oven at 200 °C for 2 hours. After that, zeolites are pilled to obtain the size of 100 mesh and formed into pellets with a diameter of 10 mm and a thickness of 3 mm. Variation of mass used was 40, 50 and 60 gram at each normality. The frame was then placed in a motorcycle air filter casing. Tests done were a stationary, road test for distance of 5 km, acceleration tests and tests of exhaust emissions.

Exhaust emissions was analyzed done by using a gas analyzer. The normality used were 0.1 N, 0.2 N, 0.3 N and 0.5 N.

After the experiments, the use of acid HCl and H₂SO₄ can improve the performance of the motorcycle, the reduction of fuel consumption and exhaust gas emissions. Variation mass of 50 gram gave better than variation of 40 and 60 gram. For normality, 0.3 N gave better than the normality of 0.1 N, 0.2 N and 0.5 N. The best fuel reduction was occurred by using HCl activator as big as 117.66 ml (22.41 %) at road test 5 km and 18.67 ml (28.20 %) at stationary test of 2500 rpm, using normality 0.3 N and 50 gram zeolite. Meanwhile, by using H₂SO₄ activator, the best result occurred also at 0.3 N and mass 50 gram zeolite for stationary test at 2500 rpm. It was 18,67 ml (28.20 %) and as big as 111 ml (26.81 %) at road test 5 km. it was occurred at normality 0.2 N and mass 50 gram zeolite. Exhaust gas emission reductions using HCl activator was as big as obtained 0.36 % (72.20 %) for CO, HC of 82 ppm (64.73%) and CO₂ of 4.3% (10.41%), whereas for H₂SO₄ were 0.46% (64.47%) for CO, HC 76 ppm (67.31%) and CO₂ 4.5% (6.25%) .

Keywords: zeolite activation of HCl and H₂SO₄, activator normalities and exhaust emissions.