

## ABSTRAK

### **PENGARUH PENGUBAHAN KADAR SILIKON DAN ALUMINIUM PADA DEBU TANAH PERMUKAAN TERHADAP ADSORPSI METILEN BIRU**

Debu tanah permukaan memiliki sifat yang sama dengan tanah yaitu mengandung silika, silikat dan aluminosilikat. Debu tanah memiliki kemampuan mengadsorpsi bahan kimia organik maupun anorganik. Tujuan penelitian ini adalah untuk mengetahui komposisi unsur kimia dalam debu tanah permukaan dengan dan tanpa perlakuan desilikasi dan dealuminasi, menjelaskan korelasi komposisi silikon dan aluminium dalam debu tanah terhadap daya adsorpsinya pada larutan metilen biru. Sampel debu tanah dari bahan induk yang telah dipreparasi dilakukan rekayasa desilikasi dan dealuminasi menggunakan variasi basa (NaOH 0,1, 0,2 dan 0,3 N) dan asam (HCl 0,1, 0,2 dan 0,3 N). Komposisi unsur kimia debu tanah dengan perlakuan rekayasa dikarakterisasi menggunakan fluoresensi sinar-X (XRF). Daya adsorpsi debu tanah yang baik dapat diketahui dari hasil interaksi dengan larutan metilen biru menggunakan Spektrofotometer Ultraviolet-Sinar Tampak (UV-Vis). Korelasi komposisi silikon dan aluminium dengan daya adsorpsi pada debu tanah menggunakan kurva regresi linear, logaritmik dan eksponensial. Mekanisme adsorpsi ditentukan dengan model isoterm Langmuir, Freundlich, BET dan Temkin. Berdasarkan hasil penelitian kandungan unsur kimia yang terdapat pada debu tanah dengan dan tanpa perlakuan rekayasa didominasi oleh silikon (Si), aluminium (Al), besi (Fe), dan kalsium (Ca). Debu tanah permukaan yang memiliki daya adsorpsi paling baik yaitu debu tanah yang diberi perlakuan dealuminasi HCl 0,1 N. Kondisi optimum proses adsorpsi debu tanah terhadap larutan metilen biru yaitu pada waktu kontak selama 5 menit, dengan massa adsorben 0,07 gram dan konsentrasi larutan metilen biru 100 ppm. Hubungan antara komposisi silikon dan aluminium berdasarkan regresi linear, eksponensial dan logaritmik menunjukkan adanya korelasi Si-Al dalam % massa dan mol dengan daya adsorpsi debu tanah terhadap larutan metilen biru. Mekanisme adsorpsi debu tanah diperkirakan sesuai dengan isoterm Langmuir.

Kata-kata kunci: debu tanah permukaan; adsorpsi; desilikasi; dealuminasi; dan metilen biru.

## **ABSTRACT**

### **INFLUENCE CHANGE OF SILICON AND ALUMINUM LEVELS IN SURFACE SOIL DUST ON ADSORPTION METHYLENE BLUE**

*Surface soil dust has the same properties as soil which is silica, silicate, and aluminosilicate. Soil dust has the capability to adsorption organic and inorganic chemical. The purpose of this research was to determine the composition of the chemical elements in surface soil dust with and without the treatment of desilication and dealumination, explain the correlation of the composition of silicon and aluminum in soil dust against its adsorption power in a solution of methylene blue. Soil dust sample from the parent material prepared were carried out by engineering desilication and dealumination using alkaline variation (NaOH 0,1, 0,2, and 0,3 N) and acid variations (HCl 0,1, 0,2, dan 0,3 N). Chemical composition of soil dust with engineering treatment was characterized using X-ray fluorescence (XRF). Good soil dust adsorption power can be seen from the result of interaction with methylene blue solution using ultraviolet-visible spectrophotometer (UV-Vis). Correlation of the composition of silicon and aluminum with adsorption power on soil dust using linear, logarithmic, and regression curves. The adsorption mechanism was determined by the isotherm model Langmuir, Freundlich, BET, and Temkin. Based on result of research on the content of chemical elements found in soil dust with and without engineering treatment dominated by silicon (Si), aluminum (Al), iron (Fe), and calcium (Ca). Surface soil dust which has the best adsorption power, namely soil dust treated with dealumination 0,1 N. Optimum condition of the soil dust adsorption process against methylene blue solution is at the contact time for 5 minutes, with a mass of 0,07 gram of adsorbent and 100 ppm of methylene blue solution concentration. The relationship between silicon and aluminum composition based on linear, exponential and logarithmic regression indicates a correlation of Si-Al in mass % and mole with adsorption power of soil dust to the methylene blue solution. Mechanism of soil dust adsorption is estimated to be in accordance with the isotherm Langmuir.*

*Keywords: surface soil dust; adsorption; desilication; dealumination; and methylene blue.*