

**MODIFIKASI ABU DASAR BATUBARA DENGAN SODIUM DODESIL SULFAT (SDS) SEBAGAI ADSORBEN ZAT WARNA METIL VIOLET 2B**

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**INTISARI**

Telah dilakukan penelitian mengenai abu dasar batubara termodifikasi sodium dodesil sulfat (SDS) sebagai adsorben zat warna metil violet 2B. Penelitian ini diawali dengan karakterisasi penyusun abu dasar batubara PLTU Paiton dengan menggunakan spektrofotometer serapan atom (SSA), spektrofotometer infra merah (FTIR), dan spektrofotometer difraksi sinar-X (XRD). Abu dasar batubara direfluks dengan HCl 6 M. Modifikasi abu dasar batubara dilakukan dengan mereaksikan abu aktivasi menggunakan larutan SDS di atas konsentrasi kritis miselnya. Proses adsorpsi metil violet 2B dilakukan dengan cara menambahkan adsorben ke dalam larutan metil violet 2B. Filtrat dianalisis dengan menggunakan spektrofotometer UV-Vis. Pada penelitian ini telah dipelajari pengaruh massa adsorben, waktu kontak adsorpsi, konsentrasi awal metil violet 2B, dan pH larutan.

Hasil karakterisasi terhadap abu dasar batubara menunjukkan bahwa kandungan terbanyak dalam abu dasar batubara berupa  $\text{SiO}_2$  dan  $\text{Al}_2\text{O}_3$ . Kondisi optimum adsorpsi 25 mL metil violet 2B oleh abu aktivasi dan abu-SDS berturut-turut pada massa adsorben 1,5 g dan 0,75 g, waktu optimum 12 menit dan 15 menit, konsentrasi awal 80 ppm dan 40 ppm, serta pH 10 dan pH 4. Adsorpsi kedua adsorben mengikuti kinetika orde kedua-semu, dengan konstanta laju reaksi metil violet 2B dengan abu aktivasi dan abu-SDS secara berurutan adalah 10,64 dan 3,36  $\text{g mg}^{-1} \text{menit}^{-1}$ . Adsorpsi dengan abu aktivasi mengikuti model isoterm adsorpsi Freundlich dengan parameter Freundlich yaitu  $2,97 (\text{mg/g})(\text{L/mg})^{1/n}$ , sedangkan adsorpsi dengan abu-SDS mengikuti model isoterm adsorpsi Langmuir, dengan konstanta Langmuir sebesar  $1,65 \text{ L mg}^{-1}$ .

Kata kunci : abu dasar batubara, adsorpsi, metil violet 2B, sodium dodesil sulfat

## **MODIFICATION OF COAL BOTTOM ASH WITH SODIUM DODECYL SULFATE (SDS) AS AN ADSORBENT OF METHYL VIOLET 2B DYE**

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### **ABSTRACT**

A research about modification of coal bottom ash with Sodium Dodecyl Sulfate (SDS) as an adsorbent for methyl violet has been conducted. This research was started with characterization of the PLTU Paiton coal bottom ash constituent materials using an atomic absorption spectrophotometer (SSA), infrared spectrophotometer (FTIR), and X-ray diffraction spectrophotometer (XRD). The coal bottom ash was refluxed with 6 M HCl to activate the functional group of the constituent materials of coal bottom ash. Modification of coal bottom ash was performed by reacting the activation ash with SDS above its critical micelle concentration. Methyl violet adsorption process was carried out by adding adsorbents to the methyl violet solution. The filtrate was analyzed using a UV-Vis spectrophotometer. This research has studied the effect of adsorbent mass, contact time of adsorption, initial concentration of methyl violet, and pH of the solution.

The results from characterization of coal bottom ash showed that the highest content in coal bottom ash consisted of SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub>. The optimum conditions from adsorption of 25 mL methyl violet by activated ash and ash-SDS at adsorbent mass of 1.5 g and 0.75 g, the optimum time 12 minutes and 15 minutes, initial concentrations 80 and 40 mg L<sup>-1</sup>, and optimum pH at pH 10 and pH 4, respectively. Adsorption of the two adsorbents follow pseudo-second order kinetics, with the rate constant of methyl violet reaction with activated ash and SDS-ash respectively 10.64 and 3.36 g mg<sup>-1</sup> minute<sup>-1</sup>. Adsorption with activated ash follows the Freundlich adsorption isotherm model with Freundlich parameter of 2.97 (mg g<sup>-1</sup>) (L mg<sup>-1</sup>)<sup>1/n</sup>, while adsorption with ash-SDS follows the Langmuir adsorption isotherm model, with Langmuir constant of 1.65 L mg<sup>-1</sup>.

**Keywords:** coal bottom ash, adsorption, methyl violet, sodium dodecyl sulfate