MATHEMATICAL MODELING OF ADSORPTION OF CHROMIUM, Cr (VI) ON PRH ACTIVATED CARBON FROM WASTEWATER

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ABSTRACT

The purpose of this study is to analyze the relationship between experimental data and concentration besides time that affect removal of chromium from wastewater using PRH activated carbon. In addition, the purpose of this study also to determine the best isothermal adsorption that is suitable for removal of chromium from wastewater. Cr (VI) is one of the main toxic heavy metal in environment that soluble in water. In order to remove Cr (VI) from wastewater, adsorption method is the most efficient and versatile technique to remove Cr (VI). Adsorption is a process one or more components (adsorbate) are attracted and bonded to the surface of a solid (adsorbent) with which they are in contact. Powder activated carbon is used in this experiment because has a size that is less than 100 μm with average diameter 15 and 25 μm which faster the rate of adsorption. The wastewater sample was collected from three different places which are from Shah Alam industrial area, water usage from faculty art and design Uitm Shah Alam and raw water from Noor Arfa Batik chendering. The amount of Cr (VI) in the wastewater was measured according to the previous research by using spectrophotometer DR 2400. From the data collected, it shows that the amount of chromium, Cr (VI) in the Shah Alam industrial area is the highest among other sample. The sample form Shah Alam industrial area was selected to determine the isothermal adsorption that suitable for removal of Cr (VI) from wastewater. Next, the data will be analyzed between contact time and concentration by plotting the graph. The rate of adsorption can be determined from the initial concentration of Cr (VI) while the other parameter keeps constant. In order to determine the adsorption isotherm, the data obtained must be fitted to Langmuir, Freundlich and BET isotherm. After that, it need to validate the best adsorption isotherm and it proved that the most suitable isotherm was Langmuir because the correlation regression value, R2 which 0.944 that near to 1. Based on result, it can be conclude that Cr (VI) can be adsorbed in activated carbon from powder rice husk, contact time of removal Cr(VI) directly proportional to percent removal of Cr(VI) whereas concentration of Cr (VI) inversely proportional to percent removal of Cr (VI) and last but not least Langmuir isotherm is the best fitted to experimental data compared BET and Freundlich.

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