THE STUDY OF ADSORPTION REMOVAL EFFICIENCY FOR COLOURING JEANS WASTEWATER BY USING COAL IN VERTICAL COLUMN PILOT PLANT

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ABSTRACT

Adsorption is often used as an alternative treatment to treat pollutants in the body of water. One of relatively familiar and high efficiency in the color adsorption process is by using granular shaped adsorbant, such as coal. Coal has three pore size which consist of macropore, mesoporous, and micropore. Most of the surface area of coal is the micropore surface area. Utilization of coal as an adsorbant can be used for treating pollutants which have pollutant characteristics which are contained in wastewater dyeing jeans.

This research was conducted by using a continuous process with coal adsorbant as the media. Coal adsorbant which was used was prepared by conducting sieve analysis for diameter (d) oc 1 cm < d < 2 cm. Jeans dyeing wastewater was obtained from the WWTP UD. XYZ. Variables which were used in this continuous process were the mass of coal which filled the 6 inch diameter of PVC columns with the height of 60 cm, 120 cm, 180 cm and the concentration of waste water which consisted of 25%, 50% and 100%. Adsorption column which was used was a down flow fixed bed adsorption column.

Effect of variations in coal mass that fills the columns of 60 cm, 120 cm, and 180 cm for color removal and PV obtained 60 cm column is much more efficient with the average color removal efficiency of 59.34% and the average removal efficiency of PV by
21.48%. Effect of varying the concentration of waste water 25%, 50%, and 100% for color removal and PV obtained a concentration of 25% is much more efficient in color removal efficiency of 73.31% and removal efficiency of 38.10% PV. Kinetic constants (K1), the largest found in column 60 cm with a K1 value of 0.594 lt/mg.jam. While the capacity of media (qo) are the largest 180 cm column with a value of qo is 4.5 x10-6 mg adsorbate/mg adsorbant. Vertical column of 120 cm is used for configuration of the adsorption column at the existing WWTP with a total of 642 pieces of the column with a series circuit in each compartment. Wastewater can be treated by the media vertical column of coal amounted to 674.1 liters/hour. WWTP output concentration using a vertical column configuration is obtained for the color is a color 0.11 PV units and levels of 67.90 mg/l.

**Keywords:** adsorption of color, adsorption of PV, coal adsorption, kinetic constants, media capacity, vertical column