

UNIVERSITI TEKNOLOGI MARA

**THE ADSORPTION OF METHYLENE BLUE
DYES FROM AQUEOUS SOLUTION ON
BIOCHAR PREPARED FROM BANANA PEEL**

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ABSTRACT

Dyes is a synthetic origin with complex aromatic molecular structures that make them more stable and difficult to biodegrade. The discharge of colored wastewater from these industries into natural streams has caused many major problems. Although methylene blue is not highly dangerous, some harmful effects can be caused. Banana plants are grown in over 130 countries causing a large number of banana skins are wasted each year. Therefore, the adsorption of methylene blue (MB) dye onto banana peel biochar (BPB) were investigated in a batch process. Different analytical techniques such as TGA and FTIR have been used to characterize this BPB. The parameter studied in this work were: adsorbent dosage [0.05-2.0g], initial dye concentration [25-250mg/L] with contact time of 24 hours. The optimum adsorption of MB was at 2.0 adsorbent dosage with 91.79 percent removal, which is the percentage of MB increased with an increase in adsorbent dose and also an increase in adsorbed amount of MB with an increase in initial MB concentration. The uptake of adsorption increased at the initial stage with time and slowed down before attaining the equilibrium. At 250 mg/L, the adsorption uptake reaches 176.94 mg/g with contact time of 24 hours. The isotherm data obtained for MB dye was best fitted with the value $R^2 = 0.9991$ by Freundlich model.

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1.1 Research Background.

Textile industries is one of the industry which growing very fast rather than other industry. Textile industries used large quantity of fresh water and chemical in many of the processes such as rinsing, sizing, finishing and dyeing. Requirement of this large amount of chemicals and dyes are contaminate the wastewater, which causes serious problems for the natural ecosystem (Temesgen, Gabbiye, & Sahu, 2018). In fact, the material industry discharge contains dye particle mixture prompting a dangerous impact. This dyes effluent become the main contributors to the pollution of water. About 10 000 tonnes of dyes has been produced annually (Azduwin Khasri, Bello, & Ahmad, 2018). These colours are incontrollable, aerobic digestion- resistant and oxidation- stable molecules. They are hard to treat due to their complicated aromatic molecular structures and synthetic origin. In Malaysia, material colouring is a main industry that consumes extensive quantity of water which generates substantial wastewater volume from various strides in the colouring and completion process.

Because of their prevalent colouring properties, particularly regarding their speed, dyes are utilized broadly in the material industry. Indeed, colours have the ideal qualities of splendid shading, straightforward application methods and water quickness also. The discharge of dyes into the effluent cause big problems due to its colour that may last in the effluent and it is difficult to be decomposable. The release of the wastewaters into streams causes damage not only to aquatic life, but also to humans, as the widespread use of azo dyes and their reaction product, for example aromatic amines, is very cancerous(A. Khasri & Ahmad, 2018). Hence, expulsion of dyes from wastewater is a must to the earth.