

Área: ANA

Activated carbon from corn husk-sucrose prepared by chemical and physicochemical processes: adsorption study of Methylene Blue dye.

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Highlights

High-yield activated carbons were obtained from a mixture of corn husks and sucrose through chemical activation; AC showed good performance for Methylene Blue dye ($Q_m = 199 \text{ mg}\cdot\text{g}^{-1}$).

Resumo/Abstract

Activated carbons (ACs) are porous materials used in adsorption processes and can be prepared from various renewable sources. In this study, ACs were prepared from a mixture of corn husks and sucrose using physicochemical (H_2SO_4 and CO_2) and chemical (H_2SO_4) activation methods, in the ratio of 1:1 and 1:0 (corn husks and sucrose, m:m), and characterized using analytical techniques and methodologies. The results showed that the AC prepared in a 1:1 ratio with chemical activation (AC1:1-C) presented the highest yield (38%) and an S_{BET} index of $491 \text{ m}^2\text{g}^{-1}$. Figure 1 of the CA1:1-C shows some microfiber fragments and smooth surface fragments, indicating the presence of carbon from the corn husks and sucrose. The CA1:1-C was used to study the adsorption of methylene blue (AM) dye, presenting a maximum monolayer adsorption capacity of $199.4 \text{ mg}\cdot\text{g}^{-1}$ as shown in Table 1 and figure 2. The adsorption process was exothermic, spontaneous, and primarily controlled by physisorption. The results demonstrated the possibility of increasing the yield of activated carbon using a precursor mixture containing sucrose, which demonstrated high adsorption capacity for the AM dye.

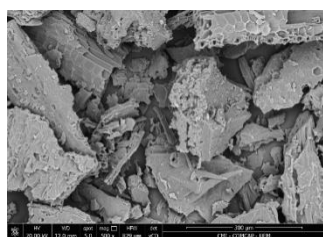


Fig. 1: SEM of AC1:1-C.

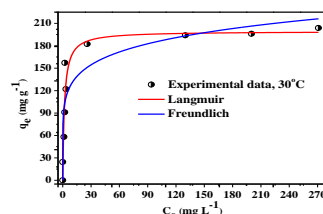


Fig.2: Adsorption isotherms for MB-AC1:1-C system at temperatures of 30°C.

Temperature	30 °C	40 °C	50 °C	60 °C
<i>Langmuir</i>				
$Q_m \text{ (mg g}^{-1}\text{)}$	199.4	192.7	202.7	207.2
$k_L \text{ (L mg}^{-1}\text{)}$	0.5476	0.5136	0.4427	0.3722
R^2	0.9225	0.9353	0.9681	0.9658
$\Delta q_e \text{ (%)}$	3.54	3.89	3.12	3.03

Table 1: Isothermal parameters.

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