

## Utilization of Activated Carbon for the Extraction and Separation of Methylene Blue in the Presence of Acid Yellow 61 Using an Inclusion Polymer Membrane

**Authors :** Saâd Oukkass, Abderrahim Bouftou, Rachid Ouchn, L. Lebrun, Miloudi Hlaibi

**Abstract :** We invariably exist in a world steeped in colors, whether in our clothing, food, cosmetics, or even medications. However, most of the dyes we use pose significant problems, being both harmful to the environment and resistant to degradation. Among these dyes, methylene blue and acid yellow 61 stand out, commonly used to dye various materials such as cotton, wood, and silk. Fortunately, various methods have been developed to treat and remove these polluting dyes, among which membrane processes play a prominent role. These methods are praised for their low energy consumption, ease of operation, and their ability to achieve effective separation of components. Adsorption on activated carbon is also a widely employed technique, complementing the basic processes. It proves particularly effective in capturing and removing organic compounds from water due to its substantial specific surface area while retaining its properties unchanged. In the context of our study, we examined two crucial aspects. Firstly, we explored the possibility of selectively extracting methylene blue from a mixture containing another dye, acid yellow 61, using a polymer inclusion membrane (PIM) made of PVA. After characterizing the morphology and porosity of the membrane, we applied kinetic and thermodynamic models to determine the values of permeability (P), initial flux (J0), association constant (K<sub>ass</sub>), and apparent diffusion coefficient (D\*). Subsequently, we measured activation parameters (activation energy (E<sub>a</sub>), enthalpy ( $\Delta H_{\#ass}$ ), entropy ( $\Delta S_{\#}$ )). Finally, we studied the effect of activated carbon on the processes carried out through the membrane, demonstrating a clear improvement. These results make the membrane developed in this study a potentially pivotal player in the field of membrane separation.

**Keywords :** dyes, methylene blue, membrane, activated carbon

**Conference Title :** ICMPNT 2024 : International Conference on Multifunctional Polymer Nanocomposites and Technologies

**Conference Location :** New York, United States

**Conference Dates :** August 08-09, 2024