ADSORPTION OF CHROMOPHORE CHEMICAL SPECIES PRESENT IN AN REAL INDUSTRUAL EFFLUENT USING ACTIVATED CARBONS

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The use of 5 commercial activated carbons with different shapes, origins and characteristics (Norit Azo, Merck granular, DCL GDC 753 from Sutcliffe Speakman (DCL) and X2MH 6/8 from Takeda) were tested for the adsorption of the chromophore compounds present in a pulp mill effluent using batch and dynamic trials. The colour removal achieved is within the range 30-90%. The highest removal is obtained with Norit AZO and the smallest with Takeda X2MH. From the batch trials we can draw the following conclusions:

- Iodine index can be used as a guide for the effluent colour removal efficiency but for this propose the methylene blue index is useless.
- Acidic groups are more important than the basic groups on the adsorption mechanisms involved in the activated carbon adsorption of the chemical species that gave colour to the effluent.
- The adsorption is proportional to the pzc and V_0 samples values.
- For small values of S_{BET} this parameter has a significant impact on the adsorption but for sample with S_{BET} bigger than $900 m^2 g^{-1}$ the adsorption is apparently independent of the BET surface area.

The column tests performed with X2MH, DCL and MERCK samples showed that we can obtain similar results as in batch tests, as expected. The breakthrough curves reveal that X2MH sample has a very fast saturation while DCL and MERCK sample have good efficiency with 90% colour removal when the effluent volume that passes through the column is 10 and 20 times the activated carbon volume, respectively.

The activated carbon adsorption also have significant positive impact on other important parameters like AOX, N and P concentration and dissolved oxygen content.

In order to better understand the adsorption mechanisms we also tested modified samples. The chemical modification of the samples shows that the oxidation increases the adsorption and on the other hand the samples reduction leads to a decrease on the adsorption. The oxidation leads to an increase in pore volume and to a diminution in the pzc value, the reduction, made in a microwave furnace, have opposite effects on the activated carbons properties.

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