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## REACTIVE DYES REMOVAL FROM WASTEWATER BY COMBINED ADVANCED TREATMENT

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### Abstract

Textile industry is one of the most pollutant and water consuming industries. Large quantities of water are required in materials preparation and dyeing, so consumption and waste generation have become serious concerns for textile manufacturers and finishers. Textile effluents are characterized by high values of quality indicators such as BOD and COD, suspended solids and heavy metals. A serious environmental problem and also an aesthetic problem is the color of the effluent. Reactive dyes are usually preferred in cotton dyeing because of their properties such as a good fixation on cellulose fibers due to the strong chemical bond created between the dye molecules and the fiber. However, effluents coming from dyeing baths have a dye concentration around 10 mg/L.

The aim of this study is to remove efficiently reactive dyes from a synthetic textile effluent by a combination of two advanced processes: ultrasonication, followed by ultrafiltration, both treatments being applied at laboratory scale. The dyes used in these experiments are Reactive Orange 16 and Reactive Blue 19. The first step is to destroy dye molecules by ultrasonication. The second step is to retain the remaining dye molecules and suspended solids and colloids formed in the previous process, using a suitable ultrafiltration membrane. Membrane selection is a very important stage, because the suspended solids and colloids may interfere with the spectrophotometrical method used to determine dye concentration, if the membrane is not capable to retain them. Solids produced after ultrasonication, were dried and analysed using SEM and AFM techniques.

These two combined processes ensure colour reduction or removal efficiency of over 85%. Ultrasonication, followed by ultrafiltration may be used as an efficient advanced treatment for textile wastewater, which can also allow the recycling of the effluent.

*Key words:* reactive dyes, textile wastewater, ultrafiltration, ultrasonication

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