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REMOVAL OF TEXTILE WASTEWATER FROM DYES (ORANGE ACTIVE AND RED ACTIVE) IN THE PRESENCE OF SURFACTANCTS AND ETHYLENGLYCOL BY COAGULATION AND CATALYTIC /PHOTOCATALYTIC OXIDATIONS METHODS

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The problem of textile wastewater treatment implies processing of large volumes of wastewater. It is needed to be used up to 100-200 kg of water in order to obtain 1 kg of a textile product[1]. Wastewater from the textile industry are a source of non-biodegradable toxic dioxins, which have a potent mutagen and carcinogen properties.

In this work, we have studied the treatment of textile wastewater by removing active dyes (orange and red active dyes) anionic, cationic and amphoteric surfactants, and also ethylene glycol. Wastewater treatment have been studied by combined methods. Firstly, have been performed coagulation with aluminium coagulant and in the second stage was performed by combining catalytic or photocatalytic oxidation methods (Fe (II), TiO_2). The last step was made by adsorption on activated charcoal of oxidatively cleaveaged compounds.

The process of diminuation of organic components concentration have been studied (by varying the COD-Cr) in model solutions, which contain a mixture of active textile dyes orange active (PA) and red active (RA) along with surfactants (cationic, anionic, amphoteric and non-ionic). Due to the fact that ethylene glycol is one of the main compounds of textile wastewater the process of purification have been studied in the absence or in the presence of ethylene glycol. Concentration of the organic components is reduced as a result of the treatment with the aluminium coagulant in model solutions, followed by oxidation with hydrogen peroxide catalyzed by iron ions (II) or irradiation with ultraviolet (UV) in the presence of titanium oxide and subsequent adsorption of the non-volatile compounds on activated charcoal. Moreover an important parameter is the nature of the dyes and surfactants, aluminium ions, hydrogen peroxide concentration, time of photocatalytic oxidation and electrochemical dissolution.

It have been determined that the most effective results are after chemical-physical treatment of wastewater mixture containing cationic surfactant, then amphoteric and non-ionic, respectively. The most difficult process of reduction of pollutants is the mixture containing anionic surfactant. In all mixtures with of PA ot RA dyes with surfactants mentioned, the most effective dye removed was in the mixture containing active dye RA.

Model solution containing dyes and surfactants in the presence of ethylene glycol are difficult to remove in contrary comparing to model solutions treatment in the absence of ethylenglycol. Therefore residual concentration of total organic compounds after coagulation is already larger and is no longer adsorbed entirely by active charcoal, thus, solutions are no more treated up to maximum allowable concentrations, that are established for treated wastewater.

Reference:

1. DI PAOLA, A.; GARCIA-LOPEZ, E.; PALMISANO, L. Survey of photacatalytic materials for enviromental remediation. Journal of hazardous materials, 2012, 211-212, p.3-29