Central composite design based electrocoagulation process for the treatment of textile effluent of S.I.T.E, industrial zone of Karachi City

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**ABSTRACT**

In the present research work, it found that the Electrocoagulation Process (EC) could be effectively utilized for the purification of tri-dye (Yellow 145, Reactive Red 195, and Blue 222) from wastewater of the textile industry located in Karachi. In order to purify the sample from the said dyes, the impacts of operational parameters namely pH, electrolysis time, amount of electrolyte and voltage were monitored on color and COD (chemical oxygen demand) removals potency using central composite design (CCD). As a result of this, the electrolysis time and amount of electrolyte showed a greater influence on color and COD removals than pH and voltage. The R² (regression coefficient) values of the effluent was observed from 87% to 98% by ANOVA (Analysis of Variance). Subsequently, the kinetic reaction was also determined in the discharge of industry. Simultaneously, The Fourier transform infrared (FTIR) analysis was performed to identify the presence of functional groups of the dyes contaminated in the sample. Afterwards, the inverse relation was observed between the concentration of NaCl and the specific electrical energy consumption (SEEC). Consequently, the sludge formation of tri-dyes was obtained from sample and then calculated. By this, the industrial effluent was filtered from three harmful dyes that can be very dangerous for human as well as aquatic life. Moreover, it is cost effective technique too because its operating cost is US$ 1.360/L. Hence, this method may be used as a purifier for effluents of textile industries.

**Keywords:** Electrocoagulation process; Central Composite Design; Kinetic study; Specific electrical energy consumption (SEEC); FTIR