**DECOLORIZATION OF INDUSTRIAL INKS AND PRINTING**

**INK WASTEWATER USING HYDRODYNAMIC CAVITATION AND SEDIMENTATION**

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**ABSTRACT**

A novel pilot-scale hydrodynamic cavitation (HC) reactor was used to decolorize industrial-grade ink solutions and printing ink wastewater (PIW). The effect of the orifice plate geometry, inlet pressure, and the synergistic effect of HC and hydrogen peroxide (H2O2) concentration were investigated. The results showed that the highest color removal was obtained using 31 holes orifice plate of 2 mm holes’ diameter, at 4 bar inlet pressure. Furthermore, although HC could not degrade completely all the industrial-grade inks, efficiency was enhanced in the presence of H2O2. The optimum concentration of H2O2 was 1.0 g/L regardless of the initial concentration of the inks studied. Under optimum operating conditions, color removal reached up to 68% for black, 39% for red, 43% for yellow, 55% for green, and 51% for cyan ink, while color removal in the PIW reached only 15%. Trying to maximize efficiency, sedimentation method was applied after HC making HC and sedimentation system (HC/SED) really appealing. H2O2 concentration, pH and HC/SED treatment time were studied to achieve high decolorization and reduce HC operation time. Specifically, firstly, under the optimal conditions at the HC/SED system color removal reached up to 92%, 91%, 90%, 98% and 90%, for black, red, yellow, cyan and green ink respectively (at pH: 7.5-8 without H2O2 addition). Furthermore, at HC/SED system (at pH: 7.5-8 and 1g/L H2O2), color removal for PIW was 92%, whereas for the MIX of the inks decolorization reached more than 90% for all the wavelengths in the selected spectrum 300-700nm. In conclusion, HC combined with green oxidants such as H2O2 could be an alternative treatment approach for real industrial wastewater streams, but a post treatment is needed to maximize efficiency. HC/SED treatment has a great potential for colloidal type wastewater streams reaching more than 90% decolorization and prevails among other techniques (i.e., H2O2 alone, sedimentation alone or even HC with or without H2O).

**KEYWORDS:** Hydrodynamic cavitation, Pilot-scale reactor, Inks, Printing ink wastewater, Wastewater treatment

**REFERENCES**

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