Chapter XII

Conclusions
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CONCLUSIONS

This investigation was aimed to study physicochemical analysis and treatments of some disperse dyes. From the instrumental analysis and dye effluent treatment data obtained, the following conclusions are drawn:

- The UV-Visible spectral analysis of the dyes reveals the presence of chromophoric groups such as azo and quinone. The colour (C), hue (H) and tone (a, b) of the dye is characterized from the colour data obtained from spectral analysis.

- The electrochemical (Cyclic voltammetry) analysis of the dyes shows poor redox property of these dyes.

- The Infrared (IR) spectral analysis of the dyes tells the presence of functional groups in different dye structures.

- The Differential scanning Calorimetric (DSC) analysis of the dyes reveals the high melting point of these dyes and phase transition change with temperature.
• The High Performance Liquid Chromatography (HPLC) analysis of dyes gives the peak characterization for the identification.

• The Mass Spectrometry (MS) analysis of dyes confirms the presence of additive (dispersing agent) in these dyes.

• Dye effluent treatment in activated carbon adsorption method shows good treatability. Decreased water solubility of these disperse dyes may increase the adsorption power.

• Dye effluent treatment in Fenton's oxidation method reveals good treatability. The ferrous sulphate and hydrogen peroxide molar ratio is very important in the efficiency of this treatment.

• Dye effluent treatment in photochemical method shows good treatability. A pH of 1 is found to be optimum. When the dye concentration or TiO₂ concentration was increased, the colour removal efficiency increased for some dyes and decreased for others, which may be based on the degradation pathways. With change in energy (photo source) of bulbs from 15 to 100 W, the colour removal efficiency was increased from 55 to 93%. This may be due to the increased power of the energy sources. With UV light illumination, it was possible to get 100 % colour removal in some
cases. When compared to sunlight and dark studies, the role of TiO$_2$ and illumination time is very significant.

- Dye effluent treatment in coagulation method shows selective treatability with particular coagulant. Out of the three coagulants (alum, ferrous sulphate and ferric chloride) studied, treatment with alum resulted better treatment efficiency than others. The performance of the individual coagulant is different for different dyes studied.

- Dye effluent treatment in electrochemical method shows good treatability as evidenced from the Ultraviolet region of absorption characteristics in the negative side.

- The colour removal efficiency calculated from various treatment methods for real and synthetic dye solutions are not identical for a particular dye effluent. Real samples show less percentage of colour removal than synthetic samples, which may be due to the interference caused by the presence of active auxiliaries in the real dye effluent.

- The colour removal efficiency calculated from spectral analysis and percentage COD removal obtained for a particular dye effluent is not identical. This may be due to the colourless organic byproducts obtained in the treatment.