CHAPTER 7

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Treatment of yarn dyeing color effluents especially reactive dyes of anthraquinone origin is extremely becoming difficult in view of the fact that the scientists of dye manufacturers improving the shades of color and resistant to all natural forces. The dye molecules day by day becoming biologically and chemically resistant. For their decolorization with ordinary means, the present work identifies a quite appropriate treatment technique in terms of efficiency, cost of treatment and reliability of treatment, by natural aging followed by chemical coagulation using ferrous sulphate, lime and bentonite clay. Natural aging requires storing of dye wastewater in a lined lagoon for at least 20 days detention time. On set of photolysis and natural aging, the coagulant dose requirements for the decolorization can be reduced, due to enhancement of reactive ness of dye molecule by exiting to the higher state and rise in surface area of the dye concentration.

The removal of dye molecule with ferrous sulphate, lime and bentonite clay, through chemical coagulation, flocculation would need a specific chemical reactor, both for chemical dispersion and agglomeration. A flash mixer with 30 seconds of detention time and a flocculator with 20 minutes of detention time would be idle for this type of chemical coagulation of dye molecule. The destabilized and flocculated dye molecule, which is in liquid phase need to be separated out by gravitational settling or dissolved air flotation. The sludge separation in
the present investigation from liquid phase by necked eye observations indicates that simple gravity settling is quite sufficient. As such a clarifier need to be incorporated in the over all treatment process, for the sludge separation, with three hours of detention time.

Voluminous sludge (4 to 5% of initial flow) is produced in the chemical coagulation and flocculation of dye molecule using ferrous sulphat, lime and bentonite clay. This sludge need to be disposed off properly (or) used elsewhere from resource utilization point of view. The present investigation brought out the utilization of the sludge in the clay brick manufacturing. The results indicate that about 15-20% of sludge usage in the brick earth would not cause any deterioration of brick quality in terms of compressive strength and percentage water absorption. The results of the leaching test on sludge-based bricks also conclude that heavy metals leached out are well within the limits of environmental protection agency (EPA) requirements for trace metals for disposal of hazardous materials.

The overall treatment process for the decolorization of dyeing plant effluents and sludge utilization is presented fig: 7.1
Fig: 7.1 Overall treatment process flow diagram for the decolorization of dyeing plant effluents and sludge utilization