

REMOVAL OF DYE PARTICLES IN DYE EFFLUENT USING WOOD CHARCOAL, A WASTE GENERATED IN DYEING PROCESS

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Abstract

Maruthamunai is a hamlet located in the Eastern Province of Sri Lanka where, dyeing industry plays a significant role. Discharge of dyeing effluent is a serious problem in this area due to the pollution of environment and the health of the inhabitants. Hence, the treatment of effluent is necessary. There are various technologies are available for treatment process and most of them are costly. On account of this, Ganem & Nawas, (2020) have proposed a simple treatment method using a byproduct (charcoal) formed during the process itself. The objectives of the previous study was to improve its applicability and efficiency using one color. But in reality there are different colors (different compounds) are released. Here five different colored samples, namely blue, pink, orange, green and brown were collected and identified conditions, such as adsorbent (wood charcoal, 63 μm) dosage, agitation speed, retention time and pH, were optimized for each case. The optimum conditions for each samples were as follows; for blue color sample the adsorbent dosage was 6.0 g/100 ml, agitation speed was 210 rpm, retention time was 90 min, and pH was 7.00. For pink color sample adsorbent dosage, agitation speed, retention time and pH were 6.0 g/100 ml, 140 rpm, 90 min and 9.60 respectively. For orange color sample 7.5 g/100 ml, 140 rpm, 60 min and 1.00 were adsorbent dosage, agitation speed, retention time and pH respectively. For green color sample adsorbent dosage, 7.0 g/100 ml, agitation speed, 178 rpm, retention time 90 min and pH, 2.00 and for brown color sample 6.5 g/100 ml, 140 rpm, 120 min and 8.60 were the adsorbent dosage, agitation speed, retention time and pH respectively. The percentage color reduction were 98.93%, 98.26%, 97.08%, 98.61%, and 98.49% for sample blue, pink, orange, green and brown respectively. When the adsorbent particle size decreased the percentage color reduction was increased. As per the results, wood charcoal can be used as a simple, cheap, ecofriendly and efficient adsorbent to remove any color (chemical compound) of the effluent, subject to optimum conditions mentioned.

Keywords: *adsorbent dosage, agitation speed, retention time*