

Chemical coagulation and sonolysis for total aromatic amines removal from anaerobically pre-treated textile wastewater: A comparative study

Akshaya K. Verma ^{1a}, Puspendu Bhunia ^{*2} and Rajesh R. Dash ^{2b}

¹ Department of Civil Engineering, Institute of Technical Education & Research, SOA University Bhubaneswar - 751 030, Odisha, India

² Department of Civil Engineering, School of Infrastructure, Indian Institute of Technology Bhubaneswar - 751 013, Odisha, India

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Abstract. The present study primarily focuses on the evaluation of the comparative effect of chemical coagulation and ultrasonication for elimination of aromatic amines (AAs) present in anaerobically pretreated textile wastewater containing different types of dyes including azo dyes. Color and COD reduction was also monitored at the optimized conditions. The production of AAs was measured spectrophotometrically in the form of total aromatic amines (TAAs) and also verified with high performance liquid chromatography (HPLC) selectively. A composite coagulant, magnesium chloride (MC) aided with aluminium chlorohydrate (ACH) in an equal ratio (MC + ACH) was utilized during the coagulation process, which yielded 31% of TAAs removal along with 85% of color and 52% of COD reduction. At optimized power (200 W) and sonication time (5 h), an appreciable TAAs degradation efficiency (85%) was observed along with 51% color reduction and 62% COD removal using ultrasonication. The chromatographic data indicate that sulphanic acid and benzidine types of aromatic amines were produced after the reductive cleavage of utilized textile dyes, which were effectively mineralized after ultrasonication. The degradation followed the first order kinetics with a correlation coefficient (R^2) of 0.89 and a first-order kinetic constant (k) of 0.0073 min^{-1} .

Keywords: aromatic amines degradation; chemical coagulation; UASB reactor effluent; textile dyes; ultrasonication

1. Introduction

Textile industries are rapidly increasing to meet the necessities of the growing population and to contribute to the economy of the nation. However, effluents from the textile industries are one of the major sources of environmental pollution and public health concerns, particularly in many urban areas. These effluents are heavily polluted with the complex organic and inorganic

*Corresponding author, Ph.D., E-mail: pbhunias@iitbbs.ac.in

^a M.Tech., E-mail: akv10@iitbbs.ac.in

^b Ph.D., E-mail: rrdash@iitbbs.ac.in

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Abbreviations

AAs	aromatic amines
abs	absorbance
ACH	aluminium chlorohydrate
BOD	biochemical oxygen demand
COD	chemical oxygen demand
HPLC	high performance liquid chromatography
HRT	hydraulic retention time
mAU	mili absorbance unit
MC	magnesium chloride
nm	nanometer
OLR	organic loading rate
TAAAs	total Aromatic amines
UASB	upflow anaerobic sludge blanket
US	ultrasound
VFA	volatile fatty acid