

ARTICLE



Pre-treatment of tannery chrome wastewater by green synthesised iron oxide nanocatalyst

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ABSTRACT

The pre-treatment of tannery wet-blue wastewater was examined using photo-oxidation of green synthesised iron nanocatalyst. The major variables which can influence of photo-oxidation process for tannery chrome wastewater were screened by response surface methodology coupled with Box-Behnken Design (BBD). Dosage of nanocatalyst, reaction time and pH were selected as effective process variables for photo-oxidation process. The treatment of photo-oxidation of green synthesised iron oxide with chrome wastewater showed Chemical Oxygen Demand (COD) removal of 96.64%, chromium removal 89.43% and colour removal of 97.5%, respectively. The persuade result showed that photo-oxidation of green synthesised iron oxide nanocatalyst was found to be an effective method for tannery chrome wastewater with low cost. The pre-treated chrome wastewater was post-treated by the Reverse Osmosis process (RO) to improve the quality of water and made it suitable for reuse.

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KEYWORDS

Photo oxidation; chrome wastewater; iron oxide; nano catalyst

1. Introduction

Wastewater treatment from leather industry is a challenging target to get a standard discharge limit in India. The environmental impact of tannery wastewater associated with environmental pollution and health risk. A large volume of soaking process wastewater from tannery creates various chemicals include proteins, blood, grease, hair, grit, etc. and biodegradable organic materials [1]. Putrefaction of wastewater pollutants conceives an obvious smell and produce negative effects to the flora and fauna. In the tanning process chromium (III) salts are converted to chromium (VI) under certain conditions, especially in wet finishing process [2]. A number of authors reported that these types of pollutants affect human life cycle, agriculture and environment [1]. It was found that the Cr concentration in groundwater is five times greater than the acceptable limit. Chromium is carcinogenic and some diseases like cancer, even death also linked to chromium pollution [3]. The peoples who are live near the tannery industry and worked in tannery have more possibilities to affect seriously by eye diseases, skin allergies, gastrointestinal problems, cancer, breathing problems, severe cough, kidney failure, diarrhoea [4].