

Coagulation-flocculation of azo dye acid orange 7 with green refined laterite soil

Abstract

A novel degradation pathway of Acid Orange 7 (AO 7) by laterite soil in coagulation process is suggested. AO 7 has a strong azo bond links with benzene and naphthalene rings. The rings in AO 7 can be cleaved during coagulation and flocculation by laterite soil. Laterite soil rich in silica component could treat AO 7 with 98.43% color removal at pH 2. It could degrade azo dye molecule to the simplest hydrocarbon structure and non-toxic products in coagulation process through a linkage of reactions: C-N bond cleavage, desulfonation, silication, diazene reductase and polymerization. Ascertainment of the degradation pathway and products were characterized by UV-Vis and FT-IR techniques. The results show that laterite soil is bi-functional as a coagulant as well as a flocculant. Sludge Volume Index (SVI) with sludge generated as low as 21.703. mL/g provides evidence that, laterite soil has polymerization characteristic by forming n-methylsiloxane and n-methyldisilathiane. Laterite soil detached sulfate ion in AO 7 to form n-methyldisilathiane, indirectly preventing sulfate ion to be exposed to environment.

Keywords

Acid Orange 7; Azo dye; Coagulation; Dye degradation; Laterite soil