

## Mechanism of pH Sensitive Flocculation for Organic Load and Colour Reduction in Landfill Leachate

**Authors :** Brayan Daniel Riascos Arteaga, Carlos Costa Perez

**Abstract :** Landfill leachate has an important fraction of humic substances, mainly humic acids (HAs), which often represent more than half value of COD, specially in liquids proceeded from composting processes of organic fraction of solid wastes. We propose in this article a new method of pH sensitive flocculation for COD and colour reduction in landfill leachate based on the chemical properties of HAs. Landfill leachate with a high content of humic acids can be efficiently treated by pH sensitive flocculation at pH 2.0, reducing COD value in 86.1% and colour in 84.7%. Mechanism of pH sensitive flocculation is based in protonation first of phenolic groups and later of carboxylic acid groups in the HAs molecules, resulting in a reduction of Zeta potential value. For pH over neutrality, carboxylic acid and phenolic groups are ionized and Zeta potential increases in absolute value, maintaining HAs in suspension as colloids and conducting flocculation to be obstructed. Ionized anionic groups (carboxylates) can interact electrostatically with cations abundant in leachate (site binding) aiding to maintain HAs in suspension. Simulation of this situation and ideal visualization of Zeta potential behavior is described in the paper and aggregation of molecules by H-bonds is proposed as the main step in separation of HAs from leachate and reduction of COD value in this complex liquid. CHNS analysis, FT-IR spectrometry and UV-VIS spectrophotometry show chemical elements content in the range of natural and commercial HAs, clear aromaticity and carboxylic acids and phenolic groups presence in the precipitate from landfill leachate

**Keywords :** landfill leachate, humic acids, COD, chemical treatment, flocculation

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