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Bioregeneration of azo dyes-loaded mono-amine modified silica in batch system: Effects of particle size and biomass acclimation condition

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Abstract

The effects of particle size of adsorbent and biomass acclimation condition on the bioregeneration of azo dye-loaded mono-amine modified silica (MAMS) adsorbents were investigated. The MAMS particles studied were of sizes 0.84-2.00 mm, 0.25-0.42 mm and 0.063-0.100 mm and the biomass acclimation conditions included the absence/presence of sucrose/bacto-peptone as the co-substrate. The results show that the bioregeneration duration of MAMS loaded with Acid Orange 7 (AO7), Acid Yellow 9 (AY9) and Acid Red 14 (AR14), respectively, increased in decreasing particle size of MAMS adsorbent. Among the dye-loaded MAMS adsorbents, only the bioregeneration efficiency of AO7-loaded MAMS was greatly affected by different particle sizes of MAMS with the bioregeneration efficiency decreased in decreasing size. Additionally, biomass acclimated to AO7 in the absence of sucrose/bacto-peptone was found to be the better choice for the bioregeneration of AO7-loaded MAMS adsorbent due to (i) shorter bioregeneration duration, (ii) less chemicals and aeration requirements and (iii) relatively good bioregeneration efficiencies found to be in the range of 78-82%.

Keywords: Bioregeneration; Modified silica; Azo dye; Particle size; Acclimation condition

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