

Organic and Synthetic: Evaluation of Environmentally Conscious Chemical Dispersant for Biological Crude Oil Remediation

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Chemical Dispersant is primarily used to reduce the size of oil droplets, effectively preventing oil spills from causing environmental havoc at water-surface level. While standard chemical dispersants used by modern oil remediation companies is effective in dispersion, it bears a large burden on marine ecosystems due to its toxic chemical makeup. In this work, Xanthan Gum (XG) was used as an environmentally friendly additive in oil dispersant formulation to enhance the stability and remediation of dispersed crude oil droplets. To determine the ideal concentrations of synthetic dispersant to organic material necessary for optimal efficiency, tests of stability, interfacial tension, and rheology were conducted. When XG was synthesized with chemical dispersant 9500A, the dispersion effectiveness of crude oil in artificial sea water (ASW) and the oil droplet stability were both greatly enhanced in financial comparison (+50% dispersion effectiveness, +40% droplet stability). In the presence of XG, lower concentrations of 9500A were needed to achieve effective dispersion and stabilization. When tested in a bacterial setting (*Bacillus cereus* S-1), the synthesized solution displayed a 52.8% biodegradation effectiveness (+41.3%). Because of the low environmental impact of XG, this would be a potential way to formulate a dispersant with lower toxicity, greater cost-efficiency, and facilitation of bio-degradation.

Awards Won:

University of Arizona: Tuition Scholarship Award