Application of Microbial Culture and Rhamnolipid for Improving the Sedimentation of Oil Sand Tailings

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Abstract

Densiýcation of oil sand tailings deposited in the tailing ponds and recovering water from them are two major challenges issues in the oil sands surface mining industry. A small increase in the tailing settlement rate (which normally is very slow) can improve the densiýcation of tailings and signiýcantly, reduce water consumption and the volume of the tailing ponds. In this work, the objective was to evaluate the role of a mixed culture of two microbial strains isolated from weathered oil and rhamnolipid (JBR 425) together with these strains in the sedimentation of ýne tailing particles. It has been found that a mixed culture of two microbial strains isolated from weathered oil increased the sedimentation. Rhamnolipid (0.5%) together with these two microbial strains at 15ÁC Ñ 2ÁC showed signiýcant increases in sedimentation (by a factor of 5.1), the concentration of larger particles (by a factor of 2.63), particle mean diameter (by a factor of 2.70) and þocculation in the tailings samples compared to the control while the zeta potential is still negative. This means that the mechanism of þocculation is probably due to increasing the hydrophobicity of

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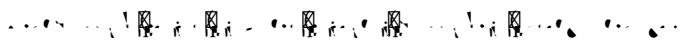

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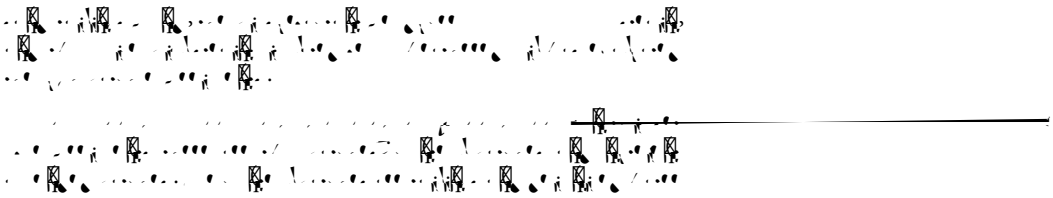
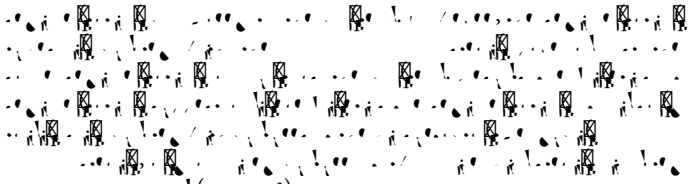
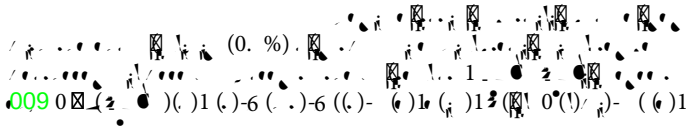
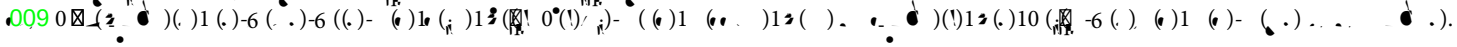
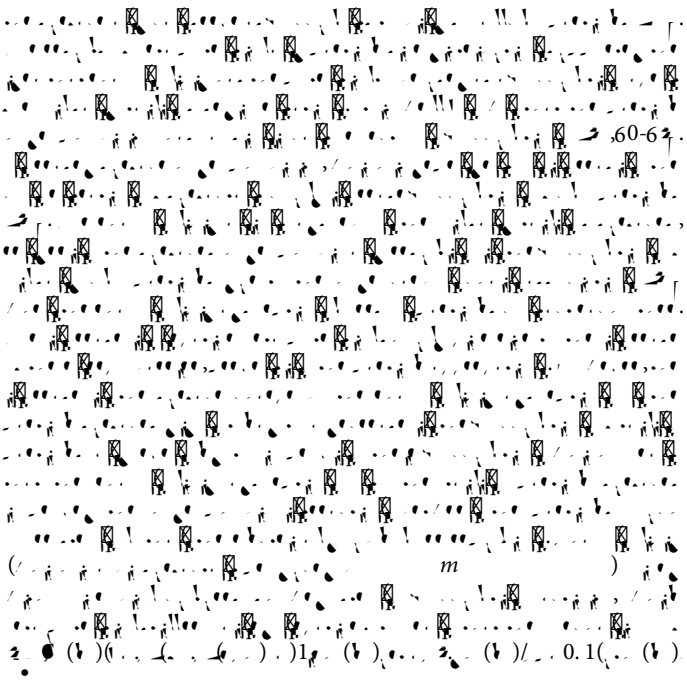








Samples		Kinetic rate (sedimentation%/day)	Final sedimentation (%)	
			Experimental	**Predicted**
23°C ± 2°C	*Bacillus subtilis* strain	0.1363	6.67	6.92
	Mixed culture of two microbial strains isolated from weathered oil	0.1845	8.77	9.17
15°C ± 2°C	0.5% rhamnolipid and two strains isolated from weathered oil			



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