

Optimization of Enzyme Induced Carbonate precipitation (EICP) cementing solution using Design of Experiments

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Abstract - Enzyme induced carbonate precipitation (EICP) is a biogeotechnical ground improvement technique that enhance the mechanical properties of the soil by binding the soil particles together through precipitating calcium carbonate at the particles contact points. Taguchi design of experiment technique was implemented to optimize the EICP cementing solution. The analysis suggests that a solution of 3 M Urea, 1.5 M CaCl₂, 3 g/L Urease and 4 g/L of milk is optimum for maximum carbonate precipitation. To verify the efficiency of the obtained solution, silica sand was treated with the optimized solution to confirm the effectiveness of the proposed solution. An average compressive strength of 1.22 MPa was achieved using this cementing solution.

Keywords: Biogeotechnical, ground improvement, biocementation, EICP, calcium carbonate precipitation.