L N Dlamini et al., J Material Sci Eng 2017, 6:4(Suppl)
DOI: 10.4172/2169-0022-C1-068

Characterization and stability of TiO_2 nanoparticles in industrial dye stuff effluent

L N Dlamini, J C Ngila and **L C Mahlalela**
University of Johannesburg, South Africa

Stability studies were conducted in different solutions (deionized water (DI), NaCl, $CaCl_2$ and $MgCl_2$) at different pH. Agglomeration and zeta potential was influenced by ionic strength, type of electrolyte and the presence of dye stuff. The DLVO theory was used to analyze the stability and/or agglomeration of the nanoparticles in the different solutions. Repulsive or attractive forces stipulated by the DLVO theory were used to quantitatively discuss the results. The increase in ionic strength increased agglomeration which was linked to pH_{PZC}, as there were minimal electrostatic repulsions at the pzc, yet the attractive van der Waals forces were dominant. Addition of the dye stuff significantly decreased the agglomeration as the dye stuff changed the overall zeta potential of TiO_2 nanoparticles to negative across the entire pH which improved stability as there were particle-particle repulsions. Monovalent and divalent cations were compared and Ca^{2+} increased the mean diameter of nanoparticles as it effectively decreased the EDL of the nanoparticles, thus enhancing agglomeration. The DLVO theory was successful at explaining, in terms of the interaction energies between nanoparticles, the phenomena that caused either agglomeration or stability of the as-synthesized TiO_2 nanoparticles in the different solutions.

Biography

L N Dlamini has his expertise in synthesis and application of nanomaterials used as photocatalyst in the remediation of pollutants in water. His research also focuses on the understating the fate and behavior of nanomaterials in surface water and also in waste water treatment plant. He, not only conducts research, but also lectures to undergraduates and postgraduate students at the University of Johannesburg. He lectures general chemistry, organic chemistry and materials. He is also involved in high school science, where he teaches lower grades and upper classes.

lndlamini@uj.ac.za

Notes: