FLOCCULATION OF WASTEWATER FROM THE PRODUCTION OF LOW VOC PAINTS

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Abstract

This dissertation describes a study of the treatment of wastewater using the flocculation process. Wastewater samples from Barloworld Plascon paints were used for the research.

Environmental pressure has necessitated the introduction of a new generation of low-solvent paints. The behaviour of these in coagulation and flocculation treatment processes has not been investigated previously. The optimum flocculent dosage for these paints was investigated. It was found that for paint wastewater to be flocculated, the effect of the dispersants needs to be counteracted, which destabilizes the colloidal suspension, enabling flocculation and settling to occur. Results showed a correlation between the solid content of wastewater and flocculent dosage.

Changes in redox potential have been found to be associated with good flocculation. In this work, redox potential was evaluated as an indicator for destabilisation of the dispersants. It was shown that redox potential can be used as an indicator of good flocculation at low dispersant concentrations. Owing to the importance of the hydrolysis reactions of Al^{3+} in flocculation, which are affected by pH, the pH range in which good flocculation occurs was determined. Results show that optimal flocculation occurred between pH 4 and 5.

A strong relationship between flocculent dosage and particle nucleation and growth was observed. Results also showed that mixing improves flocculation kinetics.

DECLARATION

I declare that this work is my unaided effort. It is being submitted for the degree of Master of Science in Engineering in the University of Witwatersrand, Johannesburg. I also declare that it has never been submitted for any degree or examination in another university.

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Signature of Dumisa Cornelius Gina

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PUBLICATION AND PRESENTATIONS FROM THIS RESEARCH WORK

1).Destabilisation of Dispersants used in paint production.D. GINA, L.L.JEWELL, B. COORAY. School of Chemical and Metallurgical Engineering, University of the Witwatersrand, Johannesburg, South Africa. PLASCON PAINTS (Barloworld Plascon South Africa (PTY) Limited). (Presented at the Water Institute of South Africa Conference. 21-24 May 2006).

DEDICATION

I dedicate this work to God and my family for their constant support and belief in me throughout the research.

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