

## **Physicochemical characterization of nonionic surfactants in oil-in-water (O/W) nano-emulsions for new pesticide formulations**

### **ABSTRACT**

Physicochemical characteristics of pre-formulation concentrates of an emulsion system of LFAMEs/APG: organosilicone/water were determined. The surfactants used were octyl/decyl polyglucosides (short-chain APG; SAPG) and dodecyl/tetradecyl/hexadecyl polyglucosides (long-chain APG; LAPG). Alkyl chain length of the APG was found to dominate the different flow behaviours of emulsions. The SAPG-emulsions exhibited Newtonian behaviour with constant viscosity, while LAPG-emulsions showed non-Newtonian behaviour with reduced viscosity. The morphology study showed larger size assembly of irregular aggregates for LAPG-emulsions as compared to SAPG-emulsions. The presence of glyphosate IPA in SAPG/LAPG emulsions formed polymerized multi-connected network structure, with the network being more densely packed in the LAPG-emulsions than SAPG-emulsions. Glyphosate IPA was found to reduce shear thinning on LAPG-emulsions while no effect was observed on SAPG-emulsions. Upon dilution of the pre-formulation concentrates, nano-formulations were formed. In SAPG-emulsion system, particles size was smaller, more uniformly dispersed and surface tension was lower than in LAPG-emulsion system.

**Keyword:** Rheology; Shear thinning; Alkylpolygluco sides, Glyphosate IPA; Nano-emulsions