Experimental Report

06/08/2015

Proposal: **9-10-1353** **Council:** 4/2014

Title: Neutron Reflection studied of Sodium Polyacrylate adsorption at the water-mica interface.

This proposal is a new proposal

Researh Area: Chemistry

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Samples: Mica, Sodium Polyacrylate, CaCl2, H2O, D2O

Instrument	Req. Days	All. Days	From	To
D17 He3 Spin Filter	3	3	12/09/2014	15/09/2014

Abstract:

An understanding of the adsorption of polymers on clay minerals is important in secondary oil recovery where polymers are used as clay swelling inhibitors. Here we propose to characterise the adsorption of sodium polyacrylate at the water mica interface using neutron reflection. Polymer adsorption on mica has been studied numerous times using other techniques but never before using neutron reflection which can provide unique molecular level detail. Here, we will determine the evolution of the adsorbed layer structure with polymer concentration and determine the key role that calcium ions have on polymer adsorption and layer structure.

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This experiment aimed to study the adsorption of polyacrylate (PAA) onto the surface of mica.
In particular we wished to investigate the role of the counter ion (valency). This work was prompted by some Surface force apparatus measurements which indicated there was adsorption. It also follows on form some of our own previous work on mica and other anionic substrates where an anionic adsorbate only binds in the presence of divalent ions and not monovalent ions, attributed to the so-called 'bridging' mechanism.

However in this experiment we were unable to observed the binding of the sodium (Na) PAA on the mica surface in the presence of either mono or divalent ions. We also tried a very preliminary measurement with the PAA calcium salt. However, there was some concern over the purity of this salt and hence the result is still a matter of uncertainity.
We also considered temperature effects with this mica system for the first time.

Even though these PAA systems did not show any adsorption, we did successfully observe adsorption of another surfactant, suggesting the conclusion that the non-adsorption of the PAA was a feature of the PAA and not a result of a poor sample.