The co-adsorption of alcohol and surfactants on mineral surfaces: Adsorption sites and aggregate structures

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Medium- and long-chained alcohols as co-adsorbates have the ability to change the properties of surfactant aggregates adsorbed on mineral surfaces. Although the interplay between alcohols and surfactants are well studied in bulk solution, similar information for the adsorbed state is scarce. Here, \(^2\)H isotopically labelled alcohols (α-position) and \(^2\)H solid-state NMR is used to study the nature of the alcohol co-adsorption sites in/on adsorbed surfactant aggregates. Both cationic and anionic surfactants on mineral surfaces are studied, which reveal charge specific interactions in the interplay between the alcohol, surfactant and mineral surface. Moreover, the data show that the effect of alcohol greatly depends on chain length and concentration of both the surfactant and alcohol. Data from \(^{13}\)C/\(^1\)H NMR, adsorption and Zeta Potential measurements are used to gain complimentary information.

Figure 1 Recoded (A) and simulated (B) \(^2\)H NMR spectra of 1-heptanol and TTAB adsorbed on silica. Two alcohol co-adsorption sites are observed; a schematic interpretation of these is given. Data from reference [1].