

Self-Organising Amphiphilic Polyoxometalate Surfactants (SOAPS)



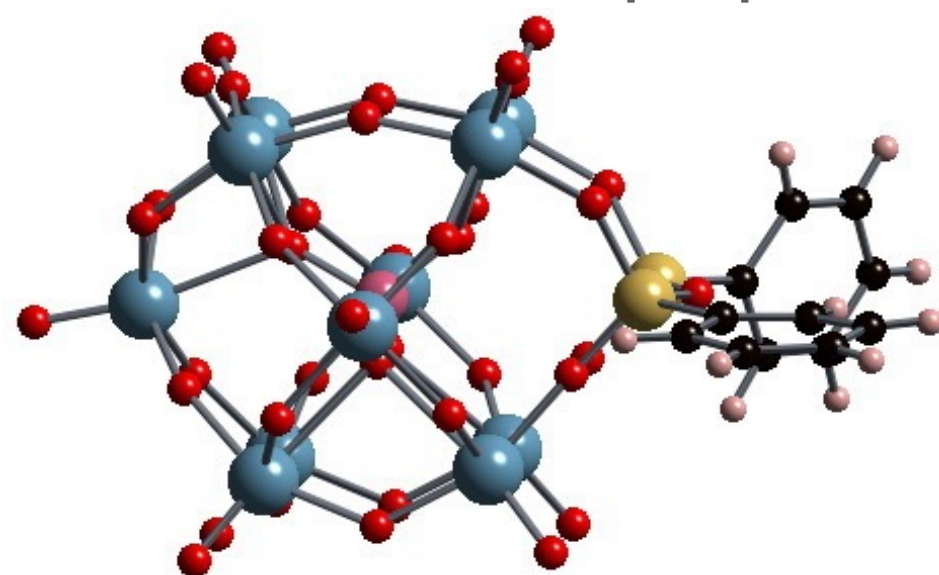
*Oliver O'Daly (130211617) (o.o'daly@newcastle.ac.uk) MChem, Dr John Errington

Introduction

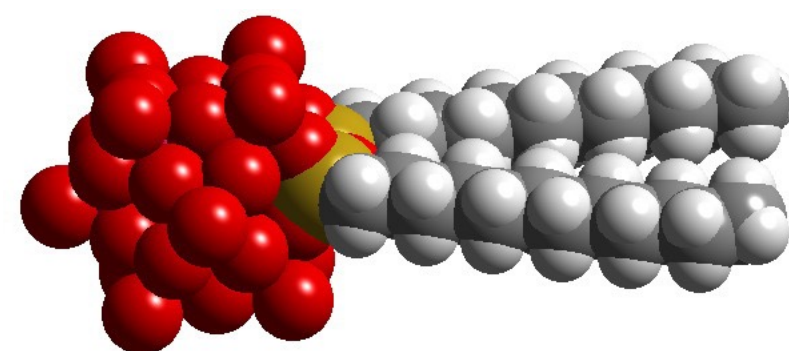
Polyoxometalates (POMs) are molecular oxides with versatile properties and many potential applications. Recent developments have provided the opportunity to investigate the potential use in molecular nanoscience.

In the right conditions these structures will self-organise and form large structures, of which the Keggin type was studied (shown below).

By covalently bonding the polyoxoanion to apolar chains, the ion can act as an amphiphilic surfactant, forming more complex structures with chemical, electrical and surfactant properties.



[PW₁₁O₃₉{O(SiPh)₂}₃]⁻



[PW₁₁O₃₉{O(SiPh)₂}₃]⁻

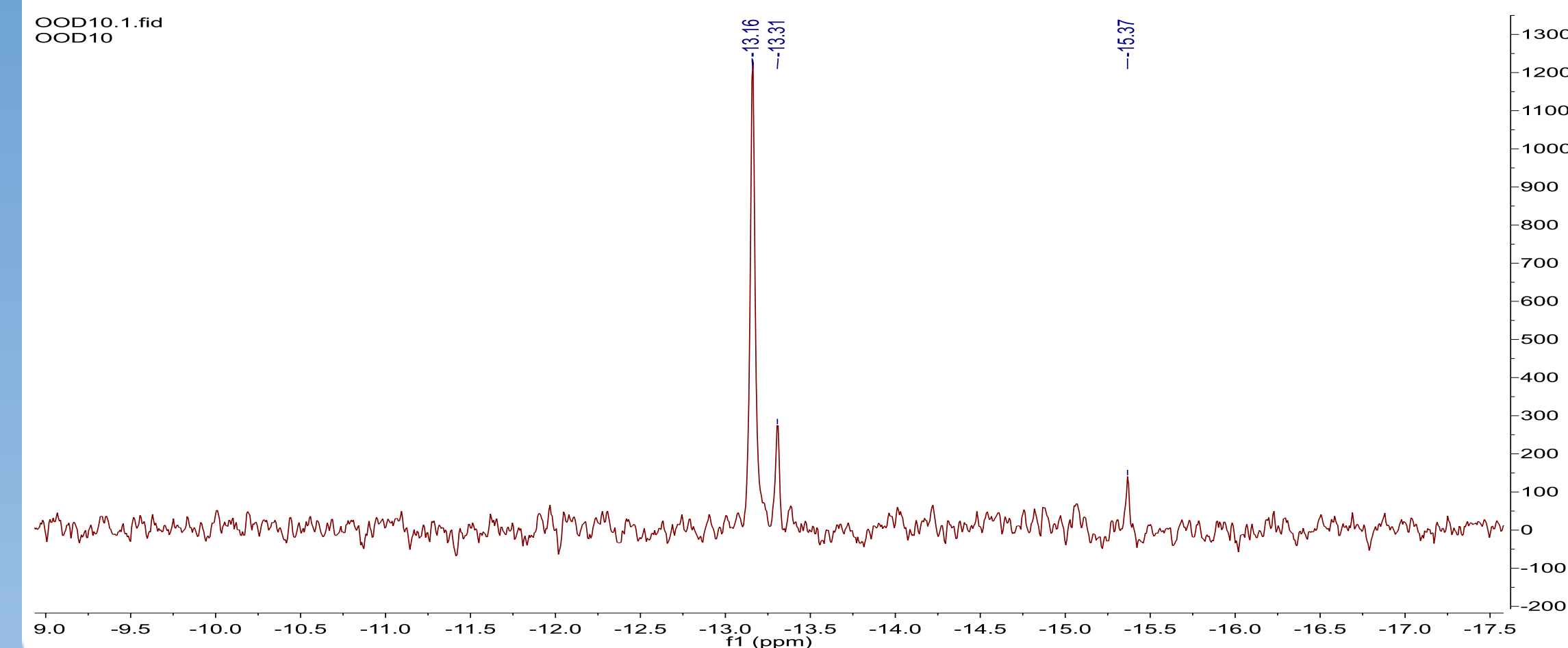
Aim

Synthesis of tetra butyl ammonium (TBA) and sodium salts of [PW₁₁O₃₉{O(SiR)₂}₃]³⁻ and characterisation.

Results

POMs with R groups = Ph, C₁₂H₂₅, C₁₆H₃₃ and C₂₀H₄₁ were successfully synthesised, and characterised by P³¹ NMR.

In the spectrum below of (TBA)₃[PW₁₁O₃₉{O(SiPh)₂}₃] the main peak at -13.16 shows the desired product, while at -13.31 is an unknown isomer, and at -15.37 the PW₁₂ byproduct.



Conclusions

The desired POMs were successfully synthesised and characterised. During the experiments the compounds were shown to have other interesting properties, such as crystal structures and nanoparticle stabilisation.