WATER-WATER INTERFACES

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Interfaces between phases of coexisting thermodynamically incompatible aqueous solutions are called water-water (w/w) interfaces. Their most common occurrence is between phase separated aqueous polymer solutions, such as solutions containing polysaccharides and proteins in food systems (Vis et al 2016). Their industrial relevance lies in the fact that water-in-water emulsions provide low calorie alternatives to oil-containing emulsions. The tension of water-water interfaces is extremely low, i.e. typically a few μN/m or less. A difference from interfaces between phase separated blends, without solvent, arises from the accumulation of solvent at the interface. This accumulation of solvent at the interface lowers the interfacial tension.

Because of the low interfacial tension w/w interfaces are highly deformable and difficult to investigate by classical methods (e.g. the Wihelmy plate method). Water, salt and, in the case of polydisperse polymers, low molar mass fractions of the polymers can freely diffuse across the interface.

An extra dimension of w/w interfaces (as compared to other solvent/solvent interfaces) is possibility of Donnan potentials across the interface, due to their permeability for salts.

The experimental study of w/w interfaces will be reviewed, with particular attention to new developments such as measurement of Donnan potentials (Vis et al 2015) and adsorption of particles and molecules at the w/w interface (N. Chatsisvili et al, 2017).

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