

Nonionic Latices in Aqueous Media

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Abstract

In order to generate stable polymer colloid dispersions in aqueous media, it is necessary to provide a repulsive interaction that outweighs the magnitude of the van der Waals attraction between the particles. For practical purposes, this can be achieved in several different ways. Firstly, by electrostatic stabilisation, in which Coulombic repulsion between the charged colloidal particles is exploited. Secondly, by steric stabilisation, whereby stability is imparted by nonionic polymers or stabilisers adsorbed or grafted on to the non-charged colloidal particles. Lastly, by using a combination of electrostatic and steric stabilisation mechanisms. Although electrostatic stabilisation is widely used in aqueous dispersions, systems stabilised by this mechanism become unstable in high electrolyte concentrations, in various pH regions, in freeze-thaw cycling and at high rates of shear. Under these conditions sterically stabilised dispersions can frequently be used. However, the synthesis of purely sterically stabilised particles in aqueous conditions is not always straight forward. Consequently a combination of the two stabilisation mechanisms commonly known as electrosteric stabilisation, is recognised as a useful route to obtain aqueous polymer colloid dispersions with good stability behaviour.

This paper describes the synthesis and characterisation of Polystyrene latices employing all three stabilising mechanisms. Comparison of the three mechanisms in terms of colloid stability is made and the respective issues are discussed. Measurements to illustrate this, include electrolyte stability, electrophoretic mobility, freeze-thaw stability and electron microscopy. The use of polymerisable nonionic surfactant to attain steric stabilisation and electrosteric stabilisation to achieve good colloid stability is discussed and the significance of introducing the polymerisable surfactant in terms of the kinetics of Polystyrene emulsion polymerisation is emphasised.