

MICROGELS

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Abstract:

Microgel particles are cross-linked polymer particles which swell under good solvent conditions, and hence have a porous, open-network structure. Various changes in environmental conditions may be used to induce swelling, such as temperature and pH. Such particles are being investigated for use, amongst other applications, as rheology modifiers, for controlled uptake / release purposes and as potential catalyst supports.

In this paper we will discuss a variety of different types of polymer microgel particles, including ones which swell on raising the temperature, others which swell on lowering the temperature, ones which swell at high pH, others which swell at low pH, and ones which are amphoteric (including polyampholytes). Another class of microgel particles is based on cross-linked siloxane polymers. We shall consider the uptake and release of a variety of species, including metal ions, simple organic molecules, surfactant molecules, polymers and small colloidal particles.

In addition, we will consider more fundamental aspects of microgels, including the relationship between the swelling of microgel particles and their bulk internal charge, the interpretation of electrophoretic mobility data, and the homo- and hetero flocculation of microgel particles. The flocculation aspects are of interest because one is able to independently "tune" the van der Waals and electrostatic interactions.