In the field of encapsulation of many types of particles like pigments, fillers and clay particles [1,2] tremendous progress has been made and applications of encapsulated inorganic particles are known, for example in car coatings. Core-shell latex particles are applied for many decades. A new challenge is in the encapsulation of clay platelets striving towards a high aspect ratio of the resulting nanostructured particles. One is struggling with surface tensions there and the thermodynamic driving force to small surface area. Similar problems exist in the field of vesicle polymerization [3]. After careful studies it turned out to be very difficult to produce a thin wall of polymer inside the hydrophobic domain of the vesicle double layer. The most common structure produced is that of the parachute, a latex particle connected to the vesicle structure. Apparently only with strong covalent bonds between the surfactant and the polymer one is able to produce hollow particles through vesicle polymerization. The field of vesicle polymerization opens many possibilities to produce many different and interesting new nanostructured particles. The phenomenon of phase separation in latex particles not only is controlled by thermodynamic factors (mainly interfacial tensions) but only by kinetic factors (rates of diffusion linked to the local viscosities). Specialty applications like intraocular eye lenses bases on transparent latices are showing the enormous potential of nanocomposites in the area of specialties [4]. So the field of emulsion polymerization is maturing to a science where control on a nanolevel becomes common practice and moreover the synthesis and application of these nanostructured particles can be on bulk scale. Added to this is the introduction of controlled radical polymerization techniques as an additional means to control molecular microstructure and morphology in latex systems. It will be shown that many different multicompartiment structures can be produced while applying the general principles of thermodynamics and kinetics in emulsion polymerizations. One example are the so-called nanobottles where a hollow structure is combined with a latex particle, making a lid for the ‘nanobottle’. The use of RAFT agents has made it possible to produce flat latex particles during clay encapsulation [5].