PC.39 CALORIFIC CONTROL OF EMULSION POLYMERISATIONS

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Conventional emulsion polymerisations involve the additional of an initiator which generates free radicals thermally or by the addition of reducing agents (Redox Systems). The rate of formation of initiator radicals and thus the rate of polymerisation cannot be controlled. The polymerisation starts slowly and then accelerates, peaking towards the end of the reaction. If the reaction temperature must be kept constant, this results in very long reaction times, particularly on large scale production reactors.

By measuring the heat of reaction it is possible to calculate the instantaneous rate of reaction and the conversion. This information can be used to control the rate of initiation and hence the rate of polymerisation, which can be used to reduce reaction time. It can also be used to control the rate of monomer addition and control the composition and homogeneity of copolymers.

This paper will describe the technology behind the calorific control of emulsion polymerisations which can be used to minimise reaction time, maximise reactor output and optimise copolymer composition.