

[Chem. Pharm. Bull., 44, 192-195 (1996)]

[Lab. of Pharm. Physical Chemistry]

A New Drug Delivery System Using Plasma-Irradiated Pharmaceutical Aids. VI. Controlled Release of Theophylline from Plasma-Irradiated Double-Compressed Tablet Composed of Water-Soluble Polymers as a Wall Material.

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The rapid drug release from a double-compressed tablet containing theophylline with the water-soluble polymer polymethacrylic acid (PMAA) or polyacrylamide (PAAm) used as a wall material can be suppressed by argon plasma irradiation and changed into the slow release due to a decrease in the solubility of water-soluble polymers used as the outer layer. This report is the first to deal with an attempt to control the release of drugs by controlling polymer solubility, and to fabricate a completely soluble controlled release type of drug delivery system (DDS) making use of plasma processing.

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[Lab. of Pharm. Physical Chemistry]

Special Features of Peroxy Radicals on Plasma-Irradiated Polymers.

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We report the special features of the peroxy radicals formed from plasma-irradiated acrylic resins such as polymethacrylic acid (PMAA) and its methyl ester (PMMA), and in two kinds of copolymers of MMA and MAA, commercially known as Eudragit L100 (6:4) and Eudragit S100 (7:3), based on the ESR including the time- and temperature-dependent spectra. Since plasma irradiation produces more than one surface radicals, the observed ESR spectra of peroxy radicals are composed of several component spectra. It was found, however, that the nature of peroxy radicals should be analyzed, according not to the structures of plasma-induced radicals, but to the motional character of peroxy radicals on a different environment of the trapping sites of polymer surfaces, each of which would have a unique amount of g -anisotropy.

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A Novel Collision-Induced Solid State Radical Recombination.

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We report the first experimental evidence for occurrence of solid-state free radical coupling of organic compound induced by application of mechanical energy based on the observation of electron spin resonance (ESR) spectra of plasma-irradiated *myo*-inositol containing the surface free radicals. The present result is not only of interest on its own right but also of special significance in connection with understanding of the nature of polymer pulverization used for manufacturing a variety of solid materials in entire field of industry.