

A FUNCTIONALIZED FINE POWDER MADE BY HIGH-ENERGY IRRADIATION OF POLYTETRAFLUOROETHYLENE

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High energy radiation produced by electron accelerators and gamma sources transform emulsion and suspension polymerizates of PTFE in the presence of the oxygen of the air into finely grained powders of PTFE functionalized with carboxyl acid groups. With increasing dose of irradiation rises the concentration of these groups and the free surface energy, too. The G-value for the splitting of the main chain bonds lies in dependence of the dose of irradiation in the range of 1.5 to 41.2 in the case of the electron accelerator and 0.64 to 12.8 using a gamma source. The specific surface of PTFE polymerizates and of finely grained powders produced thereof is approximately of the same magnitude. It amounts to about 2 m^2 per g in the case of finely grained powder from suspension polymerizate and to 14 m^2 per g and more from emulsion polymerizate. A change of the size of the primary particles takes not place. The grain size of the particles has been determined to about $2 \mu\text{m}$ or less than $0.2 \mu\text{m}$, respectively.

As successfully investigated finely grained powders of PTFE are applicable as dry lubricants, form separating agents, in aqueous and organic dispersions and as additive to formstable diaphragms for the electrolysis of alkali-metal chlorides and maintenance-free materials for slider bearings.