

3,5-Di-*tert*-butyl-4-hydroxybenzyl derivatives of hyperbranched polyesters. Synthesis and antioxidant activities.

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Abstract

Based on the commercial hyperbranched polyester polyols of the second and third generations of the Boltorn H20 and H30 series, which have 16 and 32 OH end groups, respectively, by the reaction with 4-diethylaminomethylene-2,6-di-*tert*-butylphenol, polyesters containing terminal 3,5-di-*tert*-butyl-4-hydroxybenzyl moieties were synthesized. The structure of the obtained compounds was proved by the IR and ¹H NMR spectroscopy methods. It was established that the functionalization degree of polyester polyols increases with the growth of their generation (H20 – 37.5%, H30 – 43.7%). The method of coulometric titration by electrogenerated bromine showed that the synthesized polymers have a higher antioxidant capacity than the standard antioxidant – ionol. This difference was especially pronounced in propylene glycol, which did not form strong hydrogen bonds with hydroxyl and carbonyl groups of hyperbranched polyester. In ethanol, the difference in the antioxidant capacity of ionol and synthesized polyesters was less pronounced due to the formation of strong associates of the solvent with macromolecules. The evaluation of the photoprotective properties of hyperbranched polyesters in various media was carried out by the method of absorption spectroscopy on the basis of the values of the molar extinction coefficients. Investigation of the effect of hyperbranched polyesters with terminal sterically hindered phenolic groups on the foaming ability of shampoos has shown the increase of the height of the foam column when polymers were introduced into shampoos. This effect was due to the appearance of surface-active properties, which were confirmed by tensiometry data. The concentration ranges of the input of the synthesized components into the formulations of the foaming compositions that lead to an increase in foaming as compared to the shampoo without additives were determined: for the polyester of the second generation, up to 0.078% by weight, for the third generation product, up to 0.05% by weight. The higher antioxidant activity of the hyperbranched polyester of the third generation in the propylene glycol system compared to the second generation product makes it possible to consider it as a promising additive for foaming compositions of cosmeceuticals with antioxidant effect.

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