Absorption Spectra of the Monoadduct and Eight bisadduct Regioisomers of Pyrrolidine Derivatives of C60

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Absorption spectra of the pyrrolidine N-mTEG (mTEG = CH2CH2OCH2CH2OCH2CH2OCH3) monoadduct and eight bisadducts of C60 were studied in the 230-800 nm spectral range. The 5-membered ring adducts contain an apex nitrogen atom. Allowed transitions in the ultraviolet arising from the C60 core are little affected in energy and in transition strength by the monoadduct, apart from band splitting or broadening resulting from the lowered molecular symmetry with respect to C60, whereas in the visible region the forbidden transitions are significantly perturbed by the adduct. The bisadducts have similar general spectral behaviour to that of the monoadduct, with differences that reflect the relative position of the two adducts. The second pyrrolidine adduct reinforces the perturbation of the forbidden and, to a lesser extent , the allowed transitions of the C60 core. From a comparison with the spectra of C60 [C(COOEt)2] and its bisadducts, it was concluded that the N atom in the pyrrolidine 5-membered ring adduct is a less efficient blocker of through-bond and/or through-space communication than the sp3 carbon atom in Bingel-Hirsch methanofullerenes.

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