

Photodegradation of Decafluorobiphenyl Sensitized by Aromatic Hydrocarbon in Alcoholic Media

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Photodegradation of decafluorobiphenyl ($C_{12}F_{10}$) in methanol was investigated by using aromatic hydrocarbon as sensitizer. When a methanol solution of $C_{12}F_{10}$ (1mM) was irradiated by Xe lamp with Pyrex filter ($\lambda > 280$ nm) in the presence of 2,3-dimethoxynaphthalene (2,3-DMN 1mM), substitution of fluorine by hydrogen underwent in accord with the formation of HF. The defluorination was preferentially proceeded at *o*- and *p*-positions, and successively at *m*-position. Pyrene (Py) also sensitized the defluorination, but perylene (Pery) did not. The defluorination was also observed in the presence of 1,6-dimerhoxylpyrene (1,6-DMPy) or fluoranthene (Flu) with slower rate than in the case of 1,6-DMN or Py. Removal of O_2 from the solution exalted the defluorination rate without changing degradation products. The fluorescence of 2,3-DMN was effectively quenched by $C_{12}F_{10}$, but that of Py, Flu, or Pery was not. These results indicate that the reaction is sensitized by triplet excited state. The oxidation potentials of triplet excited state are -1.17 and -1.09 V for Py and Flu, respectively, and are more positive than the reduction potential of $C_{12}F_{10}$ (-1.39 V). The comparison of the redox potentials indicates that triplet energy transfer, rather than electron transfer from sensitizer to $C_{12}F_{10}$ is involved in the reaction.

