

CIDEP and MFE Studies of Quasi-Stable Spin Correlated Radical Pairs in SDS Micellar Solution*

By Natsuo Ishiwata¹, Hisao Murai¹, Keiji Kuwata¹, Yoshio Sakaguchi²
and Hisaharu Hayashi²

¹ Department of Chemistry, Faculty of Science, Osaka University, Toyonaka,
Osaka 560, Japan

² Molecular Photochemistry Laboratory, The Institute of Physical
and Chemical Research (RIKEN), Wako, Saitama 351-01, Japan

SDS micelle / CIDEP / Spin correlated radical pair / Magnetic field effects / Tert-butylphenols

Studies on the CIDEP (chemically induced dynamic electron polarization by a time-resolved ESR) and MFE (magnetic field effect by a transient optical absorption method) of radical pairs formed by hydrogen abstraction of photo-excited xanthone from *tert*-butylphenols in SDS micellar solution, were carried out. The spectral pattern of a spin correlated radical pair (SCRPA) did not change for a few μ s. The decay rate of the transient absorption showed a large MFE, which depended on the number of substituents. These results lead to the conclusion that the mobility of radical pairs is very low in the micelle and the dynamics of radical pairs is affected by the bulky substituents.

Es wurden Untersuchungen von CIDEP (chemisch induzierte dynamische Elektronen-Spinpolarisation durch zeitaufgelöste ESR) und MFE (Magnetfeldeffekt durch optische Transientenabsorption) an Radikalpaaren durchgeführt, die durch Wasserstoffabstraktion photoangeregten Xanthons von *tert*-Butylphenolen in Lösungen von SDS-Mizellen gebildet werden. Das spektrale Muster eines spinkorrelierten Radikalpaares (SCRPA) blieb für einige μ s unverändert bestehen. Die Abbauraten der Transientenabsorption zeigten einen großen Magnetfeldeffekt, der von der Zahl der Substituenten abhing. Diese Ergebnisse führen zu dem Schluß, daß die Beweglichkeit der Radikalpaare in der Mizelle sehr gering ist und daß die Dynamik der Radikalpaare durch die sperrigen Substituenten beeinflusst wird.

1. Introduction

The dynamical behavior of a radical pair in micellar solution is one of the most interesting photochemical problems [1]. Especially, the magnetic

* Presented at the International Symposium "Magnetic Field and Spin Effects in Chemistry and Related Phenomena", 26–31 July 1992, Konstanz, Germany.