

1B2b Magnetic Field Effect on Photosensitized Oxidation of 1,3-Diphenylisobenzofuran in SDS Micellar Solution

○ChikakoUdagawa^{1,2}, Tomoyuki Izutani¹, Sayoko Yamamoto¹, Shotaro Morimoto¹, Shuichi Fukuyoshi², Ryoichi Nakagaki², Yoshifumi Tanimoto¹,

¹ Fac. of Pharm., Osaka Ohtani University

² Grad. Sch. of Nat. Sci. and Tech., Kanazawa University

Currently magnetic field has attracted much attention of scientists as it is a simple and useful tool to control various chemical, physical, and biological processes.

In this paper, the magnetic field effects (MFEs) on the photosensitized oxidation of diphenylisobenzofuran (DPBF) in aerated sodium dodecyl sulfate (SDS) micellar solution were studied using high-performance liquid chromatography.¹

When anthraquinone (AQ) was used as photosensitizer, DPBF was oxidized to o-dibenzoylbenzene (DBB). Figure 1 shows magnetic field dependence of the photodegradation yields of DPBF and AQ and formation yield of DBB. By application of a 0.2-T magnetic field both of the degradation yield of DPBF and formation yield of DBB increased by about 60%, whereas decomposition yield of photosensitizer AQ decreased by about 20%. When p-methylbenzophenone (mBP) was used as photosensitizer, similar MFE was observed. Interestingly, when 2,2'-azobis(isobutyronitrile) (AIBN) was used as photosensitizer, DPBF decomposition yield as well as DBB formation yield decreased slightly by application of a 0.2 T field.

All the results are explainable by a radical pair mechanism. Upon photoexcitation of photosensitizers, triplet or singlet radical pairs are generated. The concentration of free radicals generated from radical pairs, which are used as oxidation initiator, is affected by a magnetic field.

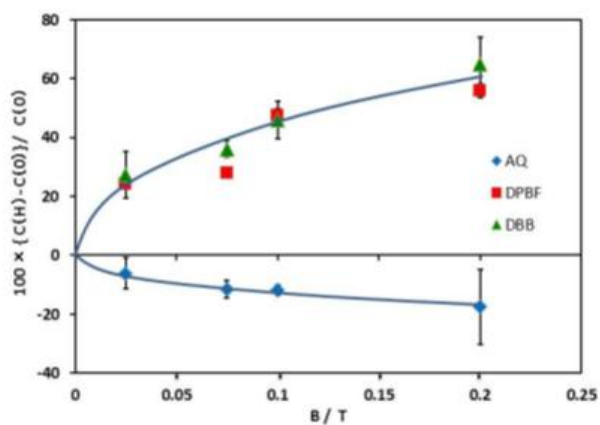


Fig. 1 Magnetic field dependence of photodegradation yield of DPBF and AQ and formation yield of DBB. $\Delta C(0)$ and $\Delta C(B)$ denote concentrations of compounds degraded or formed respectively after 60-s photoirradiation in the absence and presence of magnetic field B .

1. C. Udagawa, T. Isutani, S. Yamamoto, S. Morimoto, S. Fukuyoshi, R. Nakagaki, and Y. Tanimoto, *J. Photochem. Photobiol. A: Chem.*, **238** (2012) 16.