

BASE-INDUCED CHEMILUMINESCENCE OF N-METHYL-9-(DICARBOALKOXYMETHYL)ACRIDANES¹⁾

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A new chemiluminescent system (1) which has a -CH-C(=O)- function in it and gives a very effective fluorescent product, N-methylacridone (2), was found to give chemiluminescence light emission under basic oxidative conditions. One mole of 1 could be oxidized twice (first at i and then at ii). Hence, it could give two photons a mole. The mechanistic investigation was performed.

N-Methyl-9-(dicarboalkoxymethyl)acridanes (1: R = Me, Et, and Ph: 10^{-4}M) gave long-lasting chemiluminescence ($\tau_{1/2} \sim 40\text{ h}$) with moderate intensity ($\phi_{\text{CL}}: 10^{-4} \sim 10^{-5}$ einstein/mol) at 70°C in basic dimethyl sulfoxide (DMSO) upon oxidized by molecular oxygen.

The final product was 2, which was proved to be the emitting species (emitter) after a first strong flash. t-Butyl formate (3), which was formed by transesterification of methyl, ethyl, and phenyl formates generated once by t-BuO^- anion respectively under the conditions, was also isolated as the product.

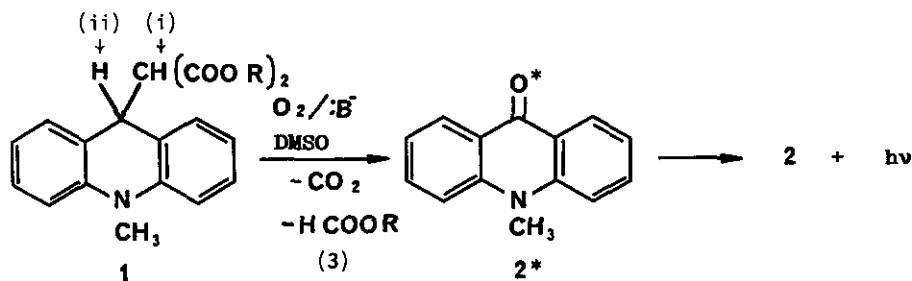


Table 1. CL of the Acridane Compounds (1) at 70°C .

1	$\phi_{\text{CL}}^{\text{a)}$ (einstein/mol) $\times 10^5$	λ_{max} (nm)		
		CL ^{b)}	FL in $\text{O}_2^{\text{c)}$	FL in $\text{Ar}^{\text{c)}$
MMA (R = Me)	8.20	435	440	416
MEA (R = Et)	7.26	435	440	364
MPA (R = Ph)	1.27	435	440	470
NMA (1)	—	—	435, ^{b)} 440 ^{c)}	—

a) Relative to the Hasting's standard. b) Slit width 40 nm. c) Slit width 24 nm.

1) Cyclic peroxides. 10.