Chinese Chemical Letters Vol. 11, No. 3, pp. 261–262, 2000

The Transient Time- Resolved Absorption Spectra of 1-Naphthylacetic Acid

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Abstract: The transient absorption spectra of 1-naphthylacetic acid in tetrahydrofuran have been obtained by laser flash photolysis technique. The transient species bands are at 509, 535 and 553 nm. These peak intensities increase in the maximum values at 10.4 μs.

Keywords: Transient spectra, laser chemistry, 1-naphthylacetic acid.

The research on naphthalene and its derivatives mainly from coal is important for developing the applications of coal chemicals. So, the molecular excited state properties should be the basic knowledge about the reaction mechanisms. However, there is no report on the transient state time-resolved spectra of 1-naphthylacetic acid up to now, hence, laser flash photolysis was carried out for 1-naphthylacetic acid, and transient time-resolved spectra are given in this letter.

1-naphthylacetic acid used was procured from Sigma, USA and used as received. Tetrahydrofuran as a solvent was purified using standard methods. The concentration was 1×10^{-4}M. The laser flash photolysis set-up uses a Nd:YAG laser model DCR-2A(30) (Spectra-Physics, USA). The solution was excited with 532 nm laser light (pulsewidth about 5 ns, laser power 20mJ). The monitoring system consists of a Xe flash lamp (75W) as the monitoring source and R466 photomultiplier with digital storage oscilloscope model TS 8123 as the detecting device (JIWATSU, Japan). The details of the experimental set-up also could be seen elsewhere[1]. The solution was deoxygenated by flushing with dry nitrogen for 30 min before use.

Figure 1 shows the decay profile of transient absorption at 555 nm and the fitting analysis reveals that it is two exponential decay with t_1=31.08 μs and t_2=25.5 μs. **Figure 2** illustrates the transient state time-resolved spectra. From **Figure 2**, there are three peaks at 509, 535 and 553 nm in the transient spectra. The absorption intensities increase in with time and reach the maximum values at 10.4 μs. Also, the bleaching at 575 nm was found. In addition, the intensity ratio of 535 to 553 nm increases in with time from high to small as shown in **Figure 2**. But, the transient spectrum similar to the $T_n\leftarrow T_1$ absorption spectrum of naphthalene was not found although 1-naphthylacetic acid molecule has an isoelectronic structure of naphthalene[2]. The assignment and investigation of transient species are under way.

Figure 1. The time trace of decay at 555 nm for 1-naphthylacetic acid in tetrahydrofuran

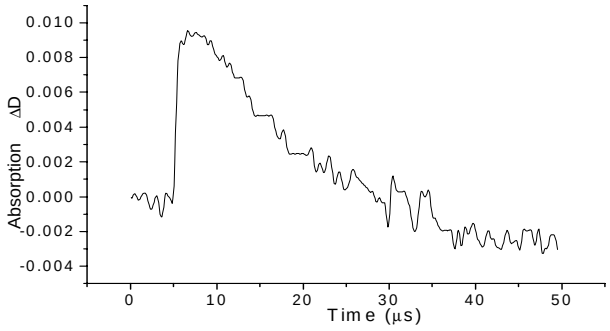
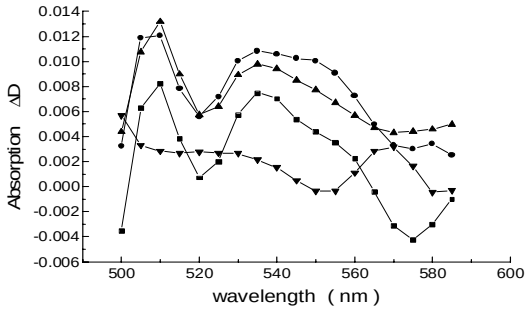


Figure 2. The transient time-resolved spectra of 1-naphthylacetic acid in tetrahydrofuran (1) 5.3, ■ (2) 6.9, ▲ (3) 10.4, ● (4) 46.9 μs, ▼



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Received 25 October 1999