

The aim of this study was to find a suitable method of preparation of anaerobic conditions in order to determine intrinsic lifetimes of carotenoid triplet states in photosynthetic light-harvesting complexes. We have compared the following three methods: (1) blowing an inert gas (nitrogen) above the surface of a liquid sample, (2) removing oxygen by means of chemical reactions catalyzed by glucose oxidase and catalase and (3) use of sodium dithionite. Each method was first tested on meso-tetra (4-sulfonatophenyl) porphine and then applied on the main light-harvesting complex of *Amphidinium carterae*. The lifetimes of the triplet states of carotenoids in the light-harvesting complex were determined from kinetics measured directly by a photomultiplier tube and from transient absorption spectra measured at different delays after the excitation pulse by an intensified CCD camera. The effects of the used substances on the sample stability were evaluated by measuring steady-state absorption spectra and pH. Blowing the sample with nitrogen was time-consuming and less efficient in attaining anaerobic conditions compared to the other two methods. In contrast, anaerobic conditions were obtained in a relatively short time after the application of sodium dithionite; however, it caused acidification of the sample related to negative effects on sample stability. The use of enzymes was evaluated as the most suitable method since anaerobic conditions were achieved within few minutes and it did not cause any degradation of the sample.