

Abstract Submitted
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Photochemistry of tracers used for molecular tagging diagnostics¹

R. NEHE, R. BASU, A.M. NAGUIB, M.M. KOOCHESFAHANI, Michigan State University — Phosphorescence characteristics of molecular tracers are important to certain class of molecular tagging diagnostics, including the recently demonstrated technique of molecular tagging manometry (MTM). The photoluminescence of tracers acetone and biacetyl are studied in an effort to understand the factors affecting their phosphorescence lifetime. The phosphorescence emission of these tracers is known to be strongly quenched by oxygen. Here we present a more complete picture of quenching by accounting for the effects of self-quenching, in addition to oxygen quenching. It is found that acetone self quenching explains the factor of order ten reduction in lifetime observed in our oxygen-free experiments. Biacetyl phosphorescence, on the other hand, is not significantly affected by self quenching. The order of magnitude reduction in biacetyl lifetime measured in our oxygen-free experiments is connected to triplet-triplet annihilation reaction occurring at high intensities of the excitation light.

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