



Photolysis of polycyclic aromatic hydrocarbons on water and ice surfaces

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Laser-induced fluorescence detection was used to measure photolysis rates of anthracene and naphthalene at the air-ice interface, and the kinetics were compared to those observed in water solution and at the air-water interface. Direct photolysis proceeds much more quickly at the air-ice interface than at the air-water interface, whereas indirect photolysis due to the presence of nitrate and hydrogen peroxide appears to be suppressed at the ice surface with respect to the liquid water surface. Both naphthalene and anthracene self-associate readily on the ice surface, but not on the water surface. The increase in photolysis rates observed on ice surfaces is not due to this self association, however. The wavelength dependence of the photolysis indicates that it is due to absorption by the PAH. No dependence of the rate on temperature is seen, either at the liquid water surface or at the ice surface. Molecular oxygen appears to play a complex role in the photolytic loss mechanism, increasing or decreasing the photolysis rate depending on its concentration.