

Decomposition of Ice by Incident Charged Particles: The Icy
Satellites and Rings

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Recent experiments on the sputtering of water ice by energetic ions have clearly indicated the decomposition of ice by charged particle radiation.¹ The process is a strong function of the ice temperature and is rather different than that produced by other radiation such as x-rays, U.V., and fast electrons. In this paper we will consider these laboratory results and evaluate possible production and escape of O₂ from the surface of icy materials in the magnetospheres of Jupiter and Saturn. For gravitationally weak bodies, produced O₂ can directly enter the magnetosphere where it will be subject to dissociation and ionization. On a body with a significant gravitational effect the O₂ can be trapped and net loss of material occurs on ionization and dissociation.

¹ Brown, W. L., Augustyniak, W. M., Simmons, E., Marcantonio, K. J., Lanzerotti, L. J., Johnson, R. E., Boring, J. W., Reimann, C. T. Nuc. Inst. and Meth. to be published (1982).