

*Laboratory Simulation of the Surface of Halley's
Comet*

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In the past year we have developed a model for the photodissociation of icy grains in comets. In general this model does not predict the radical yield that is observed in the jets of comets. To reproduce these yields, the concentrations of the radicals precursors will have to be too high to be consistent with the abundance that we expect in comets. We have also constructed a theoretical model for the formation of ions on icy cometary grains. That model shows that only a small number of the cometary ions could be produced as ions in icy grains if the particle has only positively charged ions. If it contains both positive and negative ions then it could have a higher concentration of ions without violating charge neutrality. When such a particle evaporates it can release ions with both charges into the gas phase. These ions could produce radicals via dissociative recombination with electrons if they are positive ions or by photodetachment of electrons if they are negative ions. Finally an avalanche process involving the acceleration of electrons towards charged particles is evaluated. It is shown that this will not lead directly to gas phase ions, but it might lead to additional ionization, and dissociation on the grain.

Publications:

1. 1990 W.M. Jackson and Charles Hendricks. **On the Formation of Ions and Free Radicals in Comets from Small Ice Grains.** Proceedings of the 15th Annual National Conference of the National Organization of Black Chemists and Chemical Engineers. Philadelphia, PA, Anthony L. Dent, Ed. ISSN 0896-2367, Volume 15.