Energetic processes caused by sub-keV electrons impacting on H_2O+CO ice mixtures

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The irradiation of molecules in condensed water is an important process in the chemistry of a wide variety of astronomical environments. An important component of interstellar ices is carbon monoxide, and consequently, a number of experiments have been performed in mixtures of such species with water [1, 2].

In this work, we use middle-range electrons (200-1000 eV) to study the radiation induced chemistry in H_2O + CO ice mixtures. We derive destruction and production cross-sections of parent molecules and products, and for the case of CO being the desorption cross-section. We label the products observed after irradiation with energetic electrons from IR spectra (Figure 1) to understand the mechanisms and kinetics associated with the relevant reactions. A comparison is made with the results of experiments performed using different processing sources, such as X-ray, UV and hydrogenation. Finally, we discuss the difference of desorption relevant depths [3] between in the present case and that of a pure CO ice.

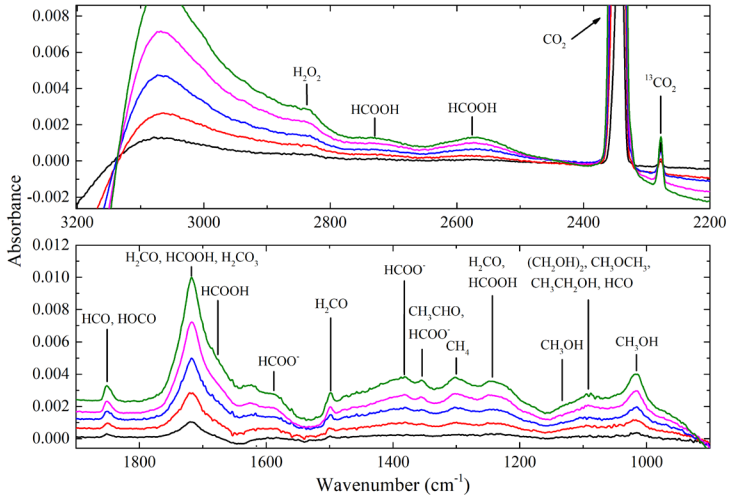

Figure 1: Assignment of products in irradiated H_2O:CO ice mixture. From bottom to top are spectrum in 200, 400, 600, 800, and 1000 eV experiments.

References

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