

UV/EUV photolysis of polar and nonpolar molecules' effect on methane containing ice mixture

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UV/EUV photolysis of N_2+CH_4 , H_2O+CH_4 and $N_2+CH_4+H_2O$ ice mixtures at 17K have been investigated in this work. IR spectra show that C_2H_6 and C_3H_8 production yields are slower in nonpolar molecule (N_2) containing ice mixtures, and lots of H atoms dissociated from CH_4 molecules will recombine with CCCN molecules to form HNCCC in N_2+CH_4 ice mixture. That makes the absorbance feature of HNCCC at 2205 cm^{-1} is stronger than CCCN at 2194 cm^{-1} [1]. Besides, all CCN bearing molecules which were formed via UV/EUV photolysis of N_2+CH_4 ice mixture converted into OCN^- while polar molecule (H_2O) was the starting component of ice mixture. This result shows that CN bearing molecules prefer to interact with OH radical to form HNCO and subsequently interacts with H_2O to form OCN^- .

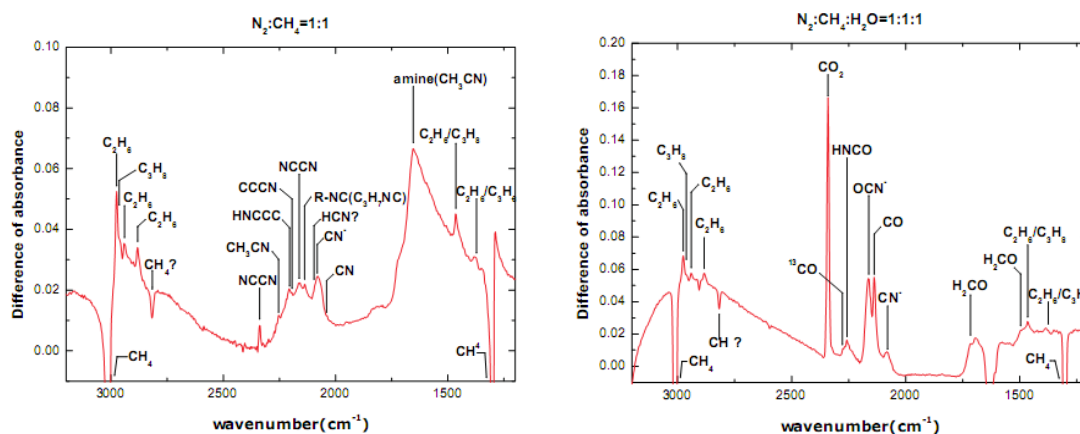


Figure 1: IR spectra of $N_2:CH_4= 1:1$ and $N_2:CH_4:H_2O = 1:1:1$ after UV/EUV irradiation.

References

- [1] J. B. Halpern, G. E. Miller, H. Okabe, and W. Nottingham, 1988, Journal of Photochemistry and Photobiology, A: Chemistry 42, 63.
- [2] R. L. Hudson and M. H. Moore, 2004, ICARUS 172, 466.