

30 Years of Photodissociation Regions:

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INVITED TALK

Photodissociation, chemistry, and isotope selection

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The rate of photodissociation of astronomical molecules varies by species and the nature of the incident ultraviolet radiation, e.g., [1]. Many observable species are known to be the products of photodissociation. I will discuss the photodissociation of relevant molecules and the calculation of photolytic rates for astrochemical models, considering the important ultraviolet irradiated environments (including cosmic-ray induced fields) and the detailed wavelength dependence of their absorption cross sections. This is part of an update to the Leiden database of molecular photodissociation rates and shielding functions [2].

Isotopic abundance anomalies in molecules probe their formation history and can preserve information about the physical conditions of a previous epoch, for example in the nebula from which the Solar system formed [3]. There are two important mechanisms with which to explain the isotopic anomalies of the elements H, N, C, and O as observed in planetary bodies, meteorites, and extrasolar objects. Low temperature isotope-exchange reactions are known to be an important driver of the case $\text{H}_3^+/\text{H}_2\text{D}^+$, formed inside photodissociating regions. The influence of isotopic-selective photodissociation is also important for the heavier molecules. I will describe the above isotope fractionation phenomena and, in particular, the important cases of CO and N_2 photofractionation [4,5].

REFERENCES

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