

The Nature of Diatomic Sulfur in Comets

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Diatomic sulfur was first discovered in comets during the close approach to Earth of comet IRAS-Araki-Alcock (C/1983 H1). The spatial distribution of S_2 was restricted to within a few hundred kilometers of the nucleus, consistent with S_2 being a parent molecule. This molecule has been detected in comets Hyakutake (C/1996 B2), Lee (C/1999 H1), and recently in Ikeya-Zhang (C/2002 C1), leading to the conclusion that S_2 is ubiquitous in comets.

The nature of the source of S_2 in comets is not known. It has been proposed that S_2 formed by irradiation of sulfur-bearing molecules in interstellar grain mantles, implying that the grains were never heated above about 30 K at any time before or after their inclusion in the nucleus. Alternative mechanisms to produce S_2 have been put forth including, solar wind sputtering of coma grains and via fast chemical reactions in the inner coma. We will explore these formation mechanisms within the context of a global comet model including coma chemistry and molecular fluorescence and discuss the relevance of S_2 to the total sulfur budget.

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