

Looking for the sulfur reservoirs in Taurus protoplanetary disks

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Abstract

Although sulfur is one of the key elements for life, the chemistry of this element in the interstellar medium (ISM) is poorly understood. The sulfur abundance in the diffuse ISM is similar to the cosmic value and the abundance measured in the Solar System, but sulfur is strongly depleted in dense molecular clouds in comparison. Since protoplanetary disks constitute the link between molecular clouds and planetary systems, identifying the sulfur reservoirs in them is vital. If the missing sulfur is locked on the icy grain mantles, sulfur atoms are expected to form H₂S preferentially due to the high hydrogen abundance and its mobility in the ice mantle. Thanks to observations with the IRAM 30m telescope, we have detected H₂S in 9 of the 19 Taurus young stellar objects observed, providing strong support to that hypothesis. In addition, we have also found evidence of a correlation between H₂S and H₂CO pointing to a similar origin for both molecules. We conclude that H₂S is a prominent reservoir of sulfur in protoplanetary disks.

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