

Insights into Dust Composition from Interstellar Gas Abundances

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Interstellar abundance measurements help us to understand one of the most fundamental properties of dust, its elemental composition. Elements in the ISM generally exist in one of two states, the gas-phase or the dust-phase (including ices). Abundance measurements are often restricted to the gas-phase, particularly in lower-density sight lines. In such cases, dust-phase abundances can only be inferred by comparing the gas-phase abundances to some assumed total (often called cosmic) abundance for the region. Much progress has been made in determining accuarete interstellar abundances over the past decade. The Hubble Space Telescope has produced a large dataset of high resolution, high signal-to-noise interstellar UV spectra. These data have produced accurate column densities of abundant elements through regions with differing physical characteristics. Attempts to translate those gas-phase abundaces into depletions and dust-phase abundances has made less progress over the years, and is still very uncertain. Most of that uncertainty lies in the abundance that is used to represent the total (gas+dust) abundances in the ISM. It is unclear whether a single set of abundances is appropriate even for just the local ISM. Abundances from the sun, young hot stars and young cool stars have all been adopted as the proxy for ISM abundances; these abundances often give different answers. Extinction models and measured molecular abundances from IR spectra should help us to sort out this question of abundances, but to date no reliable or consistent consensus has been reached among the various information sources.