

The Nature of Interstellar Organics and Their Relationship to the Solar System

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Carbonaceous materials are a primary component of interstellar dust, forming in the outflow of carbon stars and the diffuse interstellar medium (DISM). Over time, the low density DISM is swept into dense molecular clouds, the principal formation sites and repositories of most interstellar molecules. Organic compounds created in these clouds are the first step towards the complex materials that help to make planets habitable. Ground- and space-based telescopic observations trace interstellar organics from the diffuse to dense interstellar clouds, revealing that organic material in the diffuse ISM is predominantly hydrocarbon in nature, possessing little N or O, with the C distributed between the aromatic and aliphatic forms. A remarkable similarity between the hydrocarbons in dust in our Galaxy to that of distant galaxies, indicates that this organic component of the DISM is widespread and may be an important universal reservoir of prebiotic organic carbon. Spectroscopy of background stars seen through quiescent dust in clouds with no star formation activity reveals that chemistry occurs early-on. Meanwhile, observations of certain asteroids, comets, interplanetary dust particles, planets and planetary satellites present an intricate interweaving of preserved interstellar components and those that have been subsequently altered. The composition of interstellar dust grains and the evolution of dust between dense clouds (where stars and planetary systems form) and the diffuse interstellar medium (where stardust components are ejected), will be presented in this workshop on Carbon in the Solar System.