

DISCOVERY OF THE FIRST INTERSTELLAR CHIRAL MOLECULE: PROPYLENE OXIDE

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Life on Earth relies on chiral molecules, that is, species not superimposable on their mirror images. This manifests itself as a reliance on a single molecular handedness, or homochirality that is characteristic of life and perhaps most readily apparent in the large enhancement in biological activity of particular amino acid and sugar enantiomers. Yet, the ancestral origin of biological homochirality remains a mystery. The non-racemic ratios in some organics isolated from primitive meteorites hint at a primordial chiral seed but even these samples have experienced substantial processing during planetary assembly, obscuring their complete histories. To determine the underlying origin of any enantiomeric excess, it is critical to understand the molecular gas from which these molecules originated. Here, we present the first extra-solar, astronomical detection of a chiral molecule, propylene oxide ($\text{CH}_3\text{CHCH}_2\text{O}$), in absorption toward the Galactic Center. With the detection of propylene oxide, we at last have a target for broad-ranging searches for the possible cosmic origin of the homochirality of life.