

According to current knowledge, matter in the Universe evolves from extremely diluted gas, through denser, quiescent interstellar molecular clouds, to the turbulent star-forming regions. Many chemical species have already been detected in molecular clouds, consisting of gas and tiny dust particles. Physical conditions in these vast galactic spaces, in terms of density, temperature (very low) and radiation fluxes (very high) are much different from the Terrestrial ones. Such an environment, seemingly hostile for chemistry, nevertheless permits for the synthesis and existence of certain, mostly unsaturated molecules.

Sulfur, one of the ten most abundant elements, is in the focus of this project. Quite a number of sulfur-bearing molecules have already been detected in space, among them carbon sulfide (CS), carbonyl sulfide (OCS), hydrogen sulfide (H₂S), and small organic species like thiomethanol (CH₃SH). Here, we wish to elucidate the currently unknown interstellar synthetic paths for several sulfur-bearing species and to identify the factors contributing to their disappearance. We also intend to predict the spectroscopic parameters for certain relevant molecules regarded as the candidates for detection in space.