

Molecular Structure

Molecular structure refers to the three-dimensional arrangement of atoms within a molecule, dictating both its function and properties. In biological systems, molecular structures tend to exhibit a higher degree of complexity and specificity compared to those found in abiotic environments. Complex polymers, such as those with repeating units (monomers) or charged structures like polyelectrolytes, are often indicative of biological processes. The detection of such polymers could suggest biological synthesis, especially when their monomers are particularly intricate. For example, the presence of proteinogenic amino acids like tryptophan and phenylalanine, or sugar monomers with five or more carbon atoms, is a potential biosignature due to their complexity and biological relevance. These molecular structures are seldom produced in non-biological contexts, making them strong candidates for life detection.