

*Hydrogen bonds: stories and studies*

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Hydrogen is the first atom in the Mendeleev periodic table, the first to serve as key in classical and quantum mechanics models. It is present in water, proteins and amino acids; liquids and molecules of life; in hydrocarbons, first source of energy and in countless systems with multiple applications. However, the mechanisms of its involvement and its different roles are not all elucidated.

The work we present is a summary of our fifteen years of crystallographic investigations based on hydrogen bonding, scanned and monitored by X-ray diffraction on single crystals, its structural characteristics [1], physical properties and description methods of networks using Hirshfeld surface [2] and graph theory, through hybrid compounds rich in interactions, based on amino acids and amines

Fluctuations in nature, strength or direction of the hydrogen bond generate new compounds, different crystallizations and especially various space groups. Small variations in working conditions are sometimes sufficient to observe important changes in structures rich in hydrogen bonds, and in most cases, subtle phase transitions that are difficult to characterize and explain [3], are observed.

This bond-interaction (hydrogen bond), suspected to be the source of fundamental properties in life chemistry, in innumerable unexplained properties and in the formation of new compounds such as co-crystals and polymorphs [4], is so difficult to predict and hard to follow and study.

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