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Hybridization is Not Found for The Carbon in Methane Nor in Isoelectronically Related Species. The Concept of Hybridization is Still Useful and Powerful.

Sommario/riassunto

This contributed volume is based on presentations made at the 2024 Symposium on the sesquicentennial of the independent proposals of the tetrahedral carbon by van 't Hoff and Le Bel (1874), presented to the Division of the History of Chemistry of the American Chemical Society in March 2024. In 1874, the Dutch chemist, Jacobus Henricus van 't Hoff (1852-1911), and the French chemist, Joseph-Achille Le Bel (1847-1930), independently proposed that the phenomenon of optical activity could be rationalized on the basis of non-superimposable mirror image molecules—in particular, the tetrahedral carbon atom. The book features chapters dedicated to the life and work of Le Bel and the history of stereochemistry. The expansion of the van 't Hoff-Le Bel theory to elements beyond carbon, such as metals and chiral centers based on sulfur and selenium, is also explored. Additionally, the book discusses the visualization of organic molecules in three dimensions, the limits of bonding and stereochemistry in organic molecules, and the role of crystallography in stereochemistry development. Specific topics include hydrocarbons with severely distorted geometry, the quantum chemical revolution, the effects of substituents on tetrahedral carbons, the Walden inversion, and the Fischer elucidation of monosaccharide configurations. It also contains a chapter featuring the only English translation of the undergraduate thesis of the world-renowned author Primo Levi, a Jewish, Italian-born chemist and Holocaust survivor, and provides historical and scientific context. The book examines the public celebration of stereochemistry through postage stamps. This volume offers a comprehensive overview of the evolution and significance of stereochemistry in both chemistry and scientific thought, serving as a valuable resource for students and researchers interested in history of chemistry topics. .