

Alfred Werner Biography

Alfred Werner

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Biography

Werner was born in Mulhouse (Mülhausen), in the Alsace, on December 12, 1866. At the time of his birth, the region was part of France. Four years later, it was annexed by Germany during the Franco-Prussian War. Werner attended lower schools in Mulhouse and built his own chemistry laboratory in the family barn. At the age of 18, he submitted a report on an original chemical investigation to the director of the local school of chemistry. In 1886, Werner moved to Zurich, where he spent the rest of his life.

In Zurich, Werner enrolled first at the Polytechnicum and, later, at the University of Zurich. For his doctoral research, he studied the spatial arrangement of atoms in nitrogen compounds. This research was to set the direction for the most important work of his career, the development of coordination theory. From his study of a number of complex compounds, Werner came to the conclusion that atoms can bond to each other in ways other than traditional ionic and covalent bonding. For example, cobalt forms a series of compounds in which it bonds to six other atoms and groups of atoms. In all of these compounds, cobalt appears to make use of more bonds than valence theory would allow.

Werner suggested that these compounds can be explained in terms of geometry, rather than valence. The groups bonded to the central atom, cobalt, for example, can be allocated to specific locations determined by the atom's "secondary valence," or *coordination number*. That number for cobalt is six. Other metals have coordination numbers ranging from two to eight. Later it was shown that the bonding in a coordination complex occurs as the result of covalent bonds in which both electrons in the bond are donated by the attached group. Werner was awarded the Nobel Prize in chemistry in 1913 for his development of coordination theory. He died in Zurich on November 15, 1919.