

Erich Hückel (1896-1980)

Erich Hückel



Erich Hückel in 1938

| | |
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| Born | August 9, 1896 |
| | Berlin, Germany |
| Died | February 16, 1980 (aged 83) |

Above Rudolf Hilsch and [Otto Scherzer](#), in front Erich Hückel, 1935 at Stuttgart

Erich Armand Arthur Joseph Hückel [ForMemRS^{\[1\]}](#) (August 9, 1896, [Berlin](#) – February 16, 1980, [Marburg](#)) was a [German physicist](#) and [physical chemist](#). He is known for two major contributions:

- The [Debye–Hückel theory](#) of [electrolytic solutions](#)
- The [Hückel method](#) of approximate [molecular orbital](#) (MO) calculations on [\$\pi\$ electron](#) systems.

Hückel was born in the [Charlottenburg](#) suburb of [Berlin](#). He studied [physics](#) and [mathematics](#) from 1914 to 1921 at the [University of Göttingen](#).

On receiving his [doctorate](#), he became an assistant at Göttingen, but soon became an assistant to [Peter Debye](#) at [Zürich](#). It was there that he and Debye developed their theory (the [Debye–Hückel theory](#), in 1923) of

electrolytic solutions, elucidating the behavior of strong [electrolytes](#) by considering interionic forces, in order to account for their [electrical conductivity](#) and their thermodynamic [activity coefficients](#).^[2]

After spending 1928 and 1929 in [England](#) and [Denmark](#), working briefly with [Niels Bohr](#), Hückel joined the faculty of the [Technische Hochschule](#) in [Stuttgart](#). In 1935, he moved to [Phillips University](#) in [Marburg](#), where he finally was named Full Professor a year before his retirement 1961. He was a member of the [International Academy of Quantum Molecular Science](#).

Theories of unsaturated organic molecules[\[edit source\]](#) | [editbeta](#)

Hückel is most famous for developing simplified [quantum mechanics](#) methods to deal with planar unsaturated [organic molecules](#). In 1930 he proposed a σ/π separation theory to explain the restricted rotation of [alkenes](#) (compounds containing a C=C [double bond](#)). This model extended a 1929 interpretation of the bonding in [triplet oxygen](#) by [Lennard-Jones](#).^[3] According to Hückel, only the ethene σ bond is axially symmetric about the C-C axis, but the π bond is not; this restricts rotation. In 1931 he generalized his analysis by formulating both [valence bond](#) (VB) and [molecular orbital](#) (MO) descriptions of [benzene](#) and other cycloconjugated hydrocarbons. Although undeniably a cornerstone of organic chemistry, Hückel's concepts were undeservedly unrecognized for two decades. His lack of communication skills contributed. The famous Hückel [4n+2 rule](#) for determining whether ring molecules composed of C=C bonds would show [aromatic](#) properties was first stated clearly by [Doering](#) in a 1951 article on [tropolone](#).^[4] Tropolone had been recognised as an [aromatic](#) molecule by [Dewar](#) in 1945.

In 1936, Hückel developed the theory of π -conjugated [biradicals](#) (non-Kekulé molecules). The first example, known as the [Schlenk-Brauns hydrocarbon](#), had been discovered in the same year. The credit for explaining such biradicals is usually given to [Christopher Longuet-Higgins](#) in 1950.^[5]

In 1937 Hückel refined his MO theory of [pi electrons](#) in unsaturated organic molecules. This is still used occasionally as an approximation, though the more precise PPP [Pariser–Parr–Pople method](#) succeeded it in 1953. "Extended Hückel MO theory" ([EHT](#)) applies to both [sigma](#) and pi electrons, and has its origins in work by [William Lipscomb](#) and [Roald Hoffmann](#) for nonplanar molecules in 1962.

References[\[edit source\]](#) | [editbeta](#)

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