Diels-Alder Reaction Encyclopedia Article

Diels-Alder Reaction

The following sections of this BookRags Literature Study Guide is offprint from Gale's For Students Series: Presenting Analysis, Context, and Criticism on Commonly Studied Works: Introduction, Author Biography, Plot Summary, Characters, Themes, Style, Historical Context, Critical Overview, Criticism and Critical Essays, Media Adaptations, Topics for Further Study, Compare & Contrast, What Do I Read Next?, For Further Study, and Sources.

(c)1998-2002; (c)2002 by Gale. Gale is an imprint of The Gale Group, Inc., a division of Thomson Learning, Inc. Gale and Design and Thomson Learning are trademarks used herein under license.

The following sections, if they exist, are offprint from Beacham's Encyclopedia of Popular Fiction: "Social Concerns", "Thematic Overview", "Techniques", "Literary Precedents", "Key Questions", "Related Titles", "Adaptations", "Related Web Sites". (c)1994-2005, by Walton Beacham.

The following sections, if they exist, are offprint from Beacham's Guide to Literature for Young Adults: "About the Author", "Overview", "Setting", "Literary Qualities", "Social Sensitivity", "Topics for Discussion", "Ideas for Reports and Papers". (c)1994-2005, by Walton Beacham.

All other sections in this Literature Study Guide are owned and copyrighted by BookRags, Inc.



Contents

Diels-Alder Reaction Encyclopedia Article.....1

Contents.....2

Diels-Alder Reaction.....3

Diels-Alder Reaction

Two German chemists, **Otto Diels** and Kurt **Alder**, in 1928 reported an organic reaction that would eventually bear their names and win them the Nobel Prize for **Chemistry**. They had reacted a conjugated diene with a simple alkene to generate a cycloalkane. Their study of the chemistry of this reaction **lead** to significant advances in the understanding of organic reactions. It provided a useful synthetic route to a wide variety of cyclic organic compounds and, in particular, **natural products** such as the terpenoids.

The Diels-Alder reaction involves the interaction of a dienophile (literally, a "diene loving" compound) with a diene, under certain conditions. The simplest example of the reaction, the combination of butadiene with ethylene, is actually a very slow reaction requiring a **temperature** of 392°F (200°C) and pressure to react. However, the addition of an **electron** withdrawing group to the dienophile (i.e., a conjugated carbonyl) and electron releasing groups to the diene (i.e., a methyl group) results in significant improvement in the rate of reaction. For example, 2,3-dimethyl-1,3-butadiene and 3-buten-2-one react readily at room temperature and pressure.

The utility of the Diels-Alder reaction is extensive but it does have limits. The conjugated diene must be able to adopt a *cis* geometry with respect to the single bond. Bulky substituents can interfere with the reaction yield. But, because the mechanism for the reaction is pericyclic, there is retention of geometry such that quite specific products can be generated. A *cis* dienophile will generate a *cis* product and a *trans* will generate a *trans*.

Overall, the Diels-Alder reaction is one of the more useful "named" reactions in **organic chemistry** and certainly one of the most studied.