**Molecular Switches Encyclopedia Article**

**Molecular Switches**

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**

**Molecular Switches**

Molecular switches are a part of the discipline of nanotechnology—making operational machines of atomic dimensions. Specifically, a molecular switch is composed of atoms of material that function as a switch, or a **logic gate**. A logic gate is a necessary computing component, used to represent ones and zeros, the binary language of digital computing. Molecular switches would permit an atomic form of random **access** memory--a key computer **operation** that allows users to store and manipulate information.

To date, molecular switches remain more a possibility than a reality, although several research groups have manufactured atomic sized complexes that are capable of conducting electricity. In 1999, researchers from Rice University in Houston, Texas used chemical methods to manufacture a molecular switch that cold be turned on and off in a reversible manner. The chemical switch is some one million times smaller than the current silicon switches, creating the potential for further miniaturization of computers. Another research team from the Center for Nanoscale Science at the University of Liverpool, United Kingdom, has been able to control the current flowing through another type of molecular switch constructed of a gold particle six millionths of a meter in diameter linked to wires made of organic molecules strung together. By applying voltage, the electrical current flowing through the wires to the gold particle can be turned on and off. Others have been able to demonstrate electrical conductance through tubes of carbon that are smaller than a filament of DNA. Finally, a research team from UCLA has constructed two interlocked rings of a molecule called a catenane. Electrically-induced rearrangement of the rings in a reversible manner allows electron flow

The promise of such molecular switches depends on the ability to organize the tiny structures into functional devices, and then to marry these devices to electrical contacts so those machines of atomic dimensions can be built. Not only would the machines be appreciably smaller than anything possible at present, but such molecular computers would be far more powerful than those available now using silicon-based logic gates.