Clusters Encyclopedia Article

Clusters

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

Clusters Encyclopedia Article.....1

Contents.....2

Clusters.....3

Clusters

Molecular clusters are complexes of atoms. The term is most often applied to metal **atom** complexes involving between 2 and 12 metal atoms.

Atomic and molecular clusters provide means to study large scale molecules on a smaller scale. In some cases they represent small analogues for the large scale reactions (e.g., heterogeneous catalysis at metal surfaces). In addition, complex phenomena such as crystal formation and protein folding can be better analyzed in systems with smaller numbers of particles.

In metallic clusters, the metal atoms are either directly bonded through metal-metal interactions or are bridged by appropriate ligands. Cluster properties are influenced by the delocalization of electrons (electrons not associated with a particular atom) within the complex. In delocalized clusters, electrons have the ability to respond collectively.

A variety of geometries are observed for clusters. Simple binuclear and trinuclear complexes form linear and trigonal arrangements but a tetranuclear complex can occur as a tetrahedron (i.e. white **phosphorus** or P_4) or a cubane structure (i.e. Fe_4S_4). Cluster compounds with five to eight vertices are also possible and exhibit a variety of geometries. In most clusters (e.g., metal and semiconductor clusters) the geometric and electronic shell structure interact to determine the overall patterns of molecular shape and stability.

Perhaps the richest and certainly the most extensively studied cluster compounds are the carbonyl complexes. A large variety of structures, particularly with second and third row transition metal complexes, have been identified. These include clusters with more than one type of metal atom present. In addition, substitution of the neutral carbonyl ligand for phosphines, amines, or other neutral species significantly extends the number of possible compounds.