Donnan Equilibrium Encyclopedia Article

Donnan Equilibrium

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

Donnan Equilibrium Encyclopedia Article.....1

Contents.....2

Donnan Equilibrium.....3

Donnan Equilibrium

Donnan equilibrium (which can also be referred to as the Gibbs-Donnan equilibrium) describes the equilibrium that exists between two solutions that are separated by a membrane. The membrane is constructed such that it allows the passage of certain charged components (ions) of the solutions. The membrane, however, does not allow the passage of all the ions present in the solutions and is thus a selectively permeable membrane.

Donnan equilibrium is named after **Frederick George Donnan**, who proved its existence in biological cells. J. Willard Gibbs had predicted the effect some 30 years before.

The impermeability of the membrane is typically related to the size of the particular ion. An ion can be too large to pass through the pores of the membrane to the other side. The concentration of those ions that can pass freely though the membrane is the same on both sides of the membrane. As well, the total number of charged molecules on either side of the membrane is equal.

A consequence of the selective permeability of the membrane barrier is the development of an electrical potential between the two sides of the membrane. The two solutions vary in osmotic pressure, with one solution having more of a certain type (species) or types of ion that does the other solution.

As a result, the passage of some ions across the membrane will be promoted. In **bacteria**, for example, the passage of potassium across the outer membrane of Gram-negative bacteria occurs as a result of an established Donnan equilibrium between the external environment and the **periplasm** of the bacterium. The potassium enters in an attempt to balance the large amount of negative ion inside the cell. Since potassium is freely permeable, it will tend to diffuse out again. The inward movement of sodium corrects the imbalance. In the absence of a Donnan equilibrium, the bulky sodium molecule would not normally tend to move across the membrane and an electrical potential would be created.