

Chapter 2: Water

2.1 Water Weak Interactions in Aqueous Systems

Water's Qualities:

-Unusual properties of water caused by Hydrogen Bonds:

- 1) High Surface tension – beads up
- 2) High heat capacity
- 3) High Heat of Vaporization – a lot of energy is needed for water to boil
- 4) Expands as it freezes – the solid forms of water (ice) floats instead of sinks like most

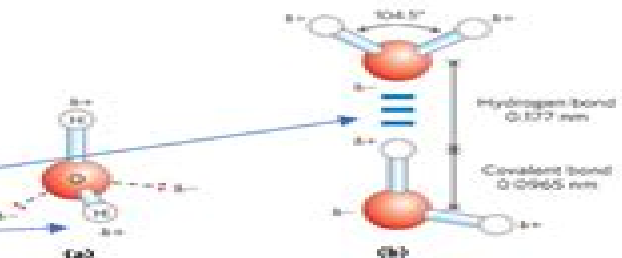
Inter/Intramolecular Forces 1-HYDROGEN BONDING

-Hydrogen bonding occurs when the hydrogen atoms of one molecule is attracted to another molecule that has Nitrogen, Oxygen, and Sulfur (NOS).

- Oxygen is the most electronegative followed by sulfur and Nitrogen.

-Picture to the right: Water Molecules

- O is more electronegative than H
- This creates a POLAR covalent bond between H and O
- The H-Bond occurs between water molecules
- O has a partial negative (-) charge
- H has a partial positive (+) charge



-Polar function groups form H-Bonds with one another and water



-Angle and distance affect the strength of H-Bonds



-we will see H-Bonds occur between:

- Hydroxyl group of alcohol and water
- Carbonyl group of a ketone and water
- between peptide groups and peptides
- complementary bases of DNA

Between the hydroxyl group of an alcohol and water



Between the carbonyl group of a ketone and water



Between peptide groups in polypeptides



Between complementary bases of DNA



Water And Aqueous Systems Study Guide

DJ Losen



Water And Aqueous Systems Study Guide:

The Absolute, Ultimate Guide to Lehninger Principles of Biochemistry Marcy Osgood, Karen A. Ocorr, 2008-04-04 The Absolute Ultimate Guide combines an innovative study guide with a reliable solutions manual in one convenient printed volume

Study Guide for Atoms, Molecules, and Life Michael S. Matta, 1981 *Study and Interpretation of the Chemical Characteristics of Natural Water* John David Hem, 1985 Deze derde herziene uitgave op het gebied van de chemische karakteristieken van natuurlijk water grond en oppervlaktewater is uitgegaan van hetzelfde basisorganisatiemodel en dient dezelfde algemene doelstellingen als voorgaande uitgaven

Guide to the Analysis of Pesticide Residues Harry Phineas Burchfield, Donald E. Johnson, 1965 Water Quality Instructional Resources Information System (IRIS), 1979 Selected Water Resources Abstracts, 1990

Thermodynamics and Kinetics of Water-Rock Interaction Eric H. Oelkers, Jacques Schott, 2018-12-17 Volume 70 of Reviews in Mineralogy and Geochemistry represents an extensive review of the material presented by the invited speakers at a short course on Thermodynamics and Kinetics of Water Rock Interaction held prior to the 19th annual V M Goldschmidt Conference in Davos Switzerland June 19 21 2009 Contents Thermodynamic Databases for Water Rock Interaction Thermodynamics of Solid Solution Aqueous Solution Systems Mineral Replacement Reactions Thermodynamic Concepts in Modeling Sorption at the Mineral Water Interface Surface Complexation Modeling Mineral Fluid Equilibria at the Molecular Scale The Link Between Mineral Dissolution Precipitation Kinetics and Solution Chemistry Organics in Water Rock Interactions Mineral Precipitation Kinetics Towards an Integrated Model of Weathering Climate and Biospheric Processes Approaches to Modeling Weathered Regolith Fluid Rock Interaction A Reactive Transport Approach Geochemical Modeling of Reaction Paths and Geochemical Reaction Networks

Energy Research Abstracts, 1990 **Enhanced Chitosan Material for Water Treatment** Ephraim Igberase, Peter Ogbemudia Osifo, Tumiasang Seodigeng, Ikenna Emeji, 2021-04-29 This book reviews some of the latest developments in the field of water treatment using multi functional chitosan based materials It covers the production of chitosan beads and membranes from chitosan powder as well as modification techniques for enhancing the material for commercial and industrial purposes The book summarizes the results of experimental adsorption desorption studies for elucidating the underlying reaction mechanism of heavy metal removal from wastewater presenting an advanced overview of an array of characterization techniques such as Fourier transform infrared spectroscopy thermogravimetric analysis x ray diffraction and scanning electron microscopy Additionally it features a look at the development and application of specialized engineering software and image analysis for modelling the kinetics of adsorption This book is ideal for scientists and engineers working in the broader field of environmental materials science It is all well suited for chemists as well as industrial and civil engineers interested in wastewater treatment and mitigation of water pollution A New Generation Material Graphene: Applications in Water Technology Mu. Naushad, 2018-06-20 This book presents a unique collection of up to date applications of graphene

for water science Because water is an invaluable resource and the intelligent use and maintenance of water supplies is one of the most important and crucial challenges that stand before mankind new technologies are constantly being sought to lower the cost and footprint of processes that make use of water resources as potable water as well as water for agriculture and industry which are always in desperate demand Much research is focused on graphene for different water treatment uses Graphene whose discovery won the 2010 Nobel Prize in physics has been a shining star in the material science in the past few years Owing to its interesting electrical optical mechanical and chemical properties graphene has found potential applications in a wide range of areas including water purification technology A new type of graphene based filter could be the key to managing the global water crisis According to the World Economic Forum s Global Risks Report lack of access to safe clean water is the biggest risk to society over the coming decade Yet some of these risks could be mitigated by the development of this filter which is so strong and stable that it can be used for extended periods in the harshest corrosive environments and with less maintenance than other filters on the market The graphene based filter could be used to filter chemicals viruses or bacteria from a range of liquids It could be used to purify water dairy products or wine or in the production of pharmaceuticals This book provides practical information to all those who are involved in this field

Material Science and Engineering Ping Chen,2016-03-18 Material Science and Engineering presents novel and fundamental advances in the field of material science and engineering This proceedings collects the comprehensive and worldwide research results on Metallic Materials and Applications Chemical Materials Electronic Materials Nanomaterials Composite and Polymer Materials Bio and Medical Materi *Monthly Catalog of United States Government Publications* ,1951 Yucca Mountain Site Characterization Project Bibliography, 1992-1993 ,1994 *EPA-430/1* ,1979-05 Monthly Catalog of United States Government Publications, Cumulative Index United States. Superintendent of Documents,1978

Indexes United States. Environmental Protection Agency,1983 **Catalog of Copyright Entries. Third Series** Library of Congress. Copyright Office,1973 *Thermodynamics of Geothermal Fluids* Andri Stefánsson,Thomas Driesner,Pascale Bénézech,2018-12-17 Volume 76 of Reviews in Mineralogy and Geochemistry presents an extended review of the topics conveyed in a short course on Geothermal Fluid Thermodynamics held prior to the 23rd Annual V M Goldschmidt Conference in Florence Italy August 24 25 2013 It covers Thermodynamics of Geothermal Fluids The Molecular Scale Fundament of Geothermal Fluid Thermodynamics Thermodynamics of Aqueous Species at High Temperatures and Pressures Equations of State and Transport Theory Mineral Solubility and Aqueous Speciation Under Hydrothermal Conditions to 300 C The Carbonate System as an Example Thermodynamic Modeling of Fluid Rock Interaction at Mid Crustal to Upper Mantle Conditions Speciation and Transport of Metals and Metalloids in Geological Vapors Solution Calorimetry Under Hydrothermal Conditions Structure and Thermodynamics of Subduction Zone Fluids from Spectroscopic Studies and Thermodynamics of Organic Transformations in Hydrothermal Fluids *Water Quality Parameters* S. Barabas,1975

Scientific and Technical Aerospace Reports ,1978-10

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