"Thermodynamic Analysis of Processes for Hydrogen Generation by Decomposition of Water"

by
John P. O'Connell
Department of Chemical Engineering
University of Virginia
Charlottesville, VA 22904-4741

A Set of Energy Education Modules for Chemical Engineering
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Preface

The intention of these Modules is to give experience to learners in using thermodynamics for process analysis of energy effects and process constraints. Thermochemical decomposition of water to manufacture hydrogen will be the principal illustration, though related units and processes are also examined for background. The set is comprised of the following Modules:

Module 1. Fundamentals
Module 2. Analysis of Single-Unit Processes
Module 3. The Whole-Process Perspective for Thermochemical Hydrogen
Module 4. A Simplified Multisection Process for Thermochemical Hydrogen
Module 5. The 3-Section Sulfur-Idodine Process for Thermochemical Hydrogen

Module 1 formulates the thermodynamic relations that will be used in all Modules. The following Modules start with a review of this material, and then proceed to example exercises with and without solutions. Module 5 has more extensive problems that to allow individual and group investigation. If it is felt that the entire Module set is too extensive for available time, it is recommended that all of the Modules be accessible to students with assignments confined to Modules 1, 3 and 5.

The numbering of equations and problems is associated with each Module. When equations are repeated, the Module numbers are adjusted.

Only the References cited in a Module are included with it.

There is also provided a Solutions Appendix with answers to all of the assigned problems, including graphs, but not the open-ended problems (Problem 1.2 and Project 5.I).

Questions and concerns about accuracy and possible errata should be addressed to John O'Connell, Department of Chemical Engineering, University of Virginia, Charlottesville, VA 22904-4741, +1 434 924 3428; jpo2x@virginia.edu.

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