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BOOK REVIEW

# D. A. J. Rand and R. M. Dell, Hydrogen Energy: Challenge and Prospects

## RSC Publishing, 2008, xxxviii + 300 pp, Price £45, ISBN: 978-0-85404-597-6

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An up to date account of the factors affecting the use of hydrogen as an energy vector and fuel is given in this book. Scientific, engineering, political and economic challenges associated with the subject are presented with clear arguments for the pros and cons of any relevant issues. A chapter synopsis is given below. Much of the recent literature regarding hydrogen is focussed on particular aspects of the subject area. This text offers a comprehensive view of the wider picture, including production, distribution, storage, fuel cells, automotive and heating applications. In addition to the more obvious topics, the authors have linked in broader information, such as carbon sequestration, to give the book a well rounded feel. The text is aimed at universities (undergraduates, postgraduates and academics) along with government agencies and professionals in the energy field. The science has been kept simple so the book is also accessible for those with a non-scientific background with an interest in the subject. The book is best suited as background reading to give an overview of the subject area However there are sufficient references for those seeking specific facts and figures. Considering the wide scope and quantity of material covered, the book is competitively priced at £45 with few competitive texts that are as up to date.

*Chapter 1: Why hydrogen energy?*
The opening chapter of the book looks at the reasons behind the interest in hydrogen as an energy vector, with topics including security and sustainability of energy supplies and climate change and atmospheric pollution.

*Chapter 2: Hydrogen from fossil fuels and biomass*
Producing hydrogen from hydrocarbon sources is addressed in the second chapter. Natural gas, coal, oil and biomass are all considered as feedstock along with current and developing pathways for their processing to yield $H_2$.

*Chapter 3: Carbon sequestration*
The third chapter follows on from chapter two with a discussion of the requirements for carbon sequestration and the processes by which large quantities of carbon may be disposed. Various methods for $CO_2$ capture and storage, such as ocean dissolution, mineralisation and geological confinement of bulk $CO_2$ are presented.

*Chapter 4: Hydrogen from water*
Continuing nicely from the previous two chapters, the second primary hydrogen source, water, is dealt with in this section. A thorough survey is given for technologies suitable for hydrogen production is presented, including electrolysis, solar methods and thermochemical cycles.

*Chapter 5: Hydrogen distribution and storage*
Bulk storage and distribution of gaseous hydrogen is complemented with a discussion of liquid hydrogen, metal hydrides and chemical storage options. Hydrogen storage on road vehicles slots in well at the end of the chapter.

*Chapter 6: Fuel cells*
The use of hydrogen in internal combustion engines and as a fuel stock for producing thermal energy are dealt with appropriately in chapters relevant to their application. Fuel cells warrant a dedicated chapter in which the principles of operation and the various chemistries are covered.

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*Chapter 7: Hydrogen fuelled transport*
Chapter seven compares fuel cells and internal combustion engines (conventional and hydrogen powered) along with hybrids for transportation applications.
*Chapter 8: Hydrogen energy: the future?*
The final chapter brings together the previous seven chapters, concisely summarising the driving forces along with the technical and political challenges for the use of hydrogen as a widespread energy media.