

STATISTICS ON HYDROGEN PRODUCTION AND CONSUMPTION

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Summary

Statistics for production and consumption of hydrogen are presented. Since most hydrogen is produced and consumed on-site, it is difficult to estimate this amount. The production data are based on data from the United States Department of Energy and consumption data are from the Ministry of International Trade and Industry of Japan. Inconsistency between these two sets of data may be attributed to the different ways of estimating on-site hydrogen.

1. Introduction

Since most of the hydrogen on the earth's surface exists in the form of water as a compound with oxygen, hydrogen gas must be produced by some means. Most hydrogen is produced on-site, which means produced hydrogen is consumed in the same factory. Only a small proportion of hydrogen gas is sold on the market, where hydrogen is traded in the form of compressed gas in cylinders and liquefied hydrogen. In some cases, hydrogen is supplied to customers by pipeline. The biggest demand for on-site hydrogen is in ammonia production, followed by oil refinery, methanol production and petrochemical industries. Electronics is also an important user of hydrogen gas, though the amount of consumption is small.

Production of hydrogen is mainly from fossil fuels such as natural gas and oil. A small proportion of hydrogen is produced by electrolysis. For hydrogen production from fossil fuels, steam reforming or partial oxidation reaction and water gas shift processes are used. Water electrolysis is used to produce hydrogen where inexpensive hydroelectricity is available or commercial hydrogen is difficult to obtain. Some hydrogen is produced as a by-product of sodium hydroxide and chlorine production by electrolysis of sodium chloride solution. Details of these production processes can be found in *Hydrogen Production from Fossil Fuels* and in *Hydrogen Production from Water*.

The statistics of hydrogen production and consumption are given in the following sections. Because most hydrogen is consumed on-site, there are not many data available, and the data seem not to be accurate enough.

2. Statistics

2.1 Production

Hydrogen production from various origins is shown in Table 1. These data are taken from the website of the US Department of Energy, in year 2000.

| Origin | Amount in billion m ³ , at normal temperature and pressure, per year | Percentage |
|--------------|---|------------|
| Natural gas | 240 | 48 |
| Oil | 150 | 30 |
| Coal | 90 | 18 |
| Electrolysis | 20 | 4 |
| Total | 500 | 100 |

Table 1. Recent worldwide production numbers for hydrogen.

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Visit: <http://www.eolss.net/Eolss-sampleAllChapter.aspx>

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Biographical Sketch

Isao Abe, born 16 September 1939, in Osaka, Japan, received his Bachelor of Engineering degree from the Department of Fuel Engineering, Faculty of Engineering, University of Tokyo (1963), and Master of Engineering from the Department of Reaction Chemistry of the same faculty, the same university (1966). He worked for Showa Denko K.K. as a chemical engineer (1966–1999), and was involved in development of the advanced alkaline water electrolyzer under the Sunshine Project of the Japanese

government as the director of technical development (1974–1984); during that period, he worked as formal alternate representative of Japan to the YEA Task IV (water electrolysis) workshop. He has been editor-in-chief of *Journal of the Hydrogen Energy System Society of Japan* since 1998.

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