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Acetylene from Hydrocarbons

Richard E. Gannon, Textron Defense Systems

Kirk-Othmer Encyclopedia of Chemical Technology

DOI: 10.1002/0471238961.0103052007011414.a01
Article Online Posting Date: December 4, 2000.

PREVIOUS

1. Manufacture From Hydrocarbons

Although acetylene production in Japan and Eastern Europe is still based on the calcium carbide process, the large produ in the United States and Western Europe now rely on hydrocarbons as the feedstock. Now more than 80% of the acetyl produced in the United States and Western Europe is derived from hydrocarbons, mainly natural gas or as a coproduct i production of ethylene. In Russia about 40% of the acetylene produced is from natural gas.

Development of the modern processes for the manufacture of acetylene from hydrocarbons began in the 1920s when Ba Anilin- und Soda-Fabrik (BASF) initiated an intensive research program based on Berthelot's early (1860) laboratory investigations on the conversion of low molecular weight aliphatic hydrocarbons to acetylene by means of thermal crackin BASF's development of the electric arc process led to the first commercial plant for the manufacture of acetylene from hydrocarbons. This plant was put into operation at Chemische Werke Hüls in Germany in 1940. In the United States, commercial manufacture of acetylene from hydrocarbons began in the early 1950s; expansion was rapid until the mid to l 1960s, when acetylene was gradually supplanted by cheaper ethylene as the main petrochemical intermediate.

1.1. Theory

The hydrocarbon to acetylene processes that have been developed to commercial or pilot-plant scale must recognize and advantage of the unique thermodynamic properties of acetylene. As the free energy data shown in Figure 1 indicate, the common paraffinic and olefinic hydrocarbons are more stable than acetylene at ordinary temperatures. As the temperatur increased, the free energy of the paraffins and olefins become positive while that of the acetylene decreases, until at >140 acetylene is the most stable of the common hydrocarbons. However, it is also evident that, although it has the lowest free energy of the hydrocarbons at high temperature, it is still unstable in relation to its elements C and H_2. Thus it is necessary heat the feedstock extremely fast to minimize its decomposition to its elements and, for a similar reason, the quench must

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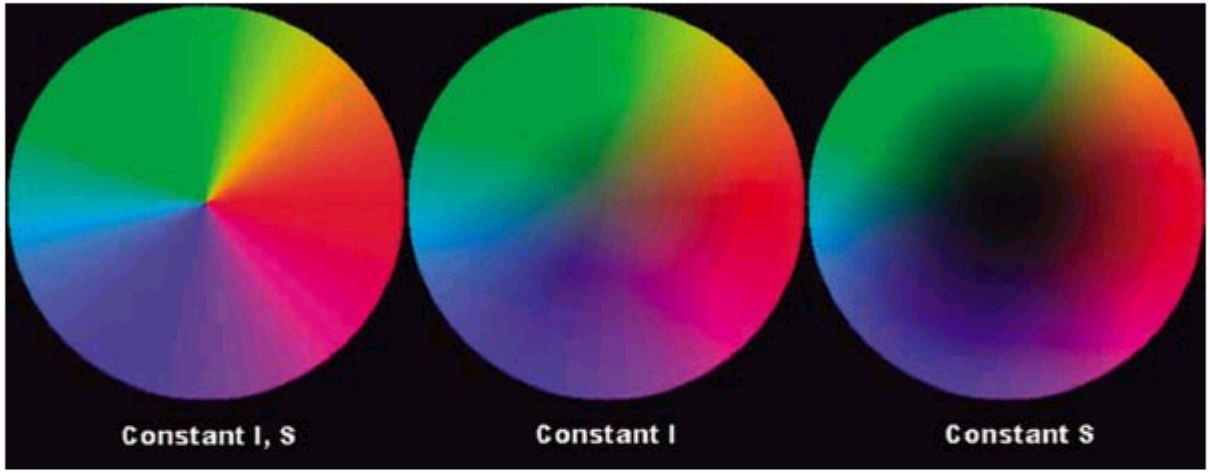
Figure 17. Color charts: Hue varies with angle according to Fig. 13. Left: constant saturation and intensity. Middle: constant intensity, saturation goes to zero at the center. Right: c
saturation, intensity goes to zero at the center.



Encyclopedia of Imaging Science and Technology
Published by John Wiley & Sons, Inc.

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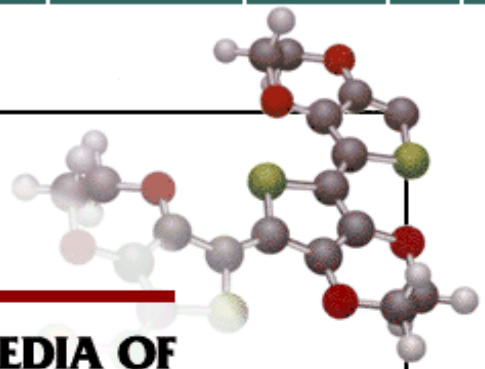
- Kirk-Othmer Encyclopedia of Chemical Technology
- Ullmann's Encyclopedia of Industrial Chemistry

Major Reference Works

- Patty's Industrial Hygiene and Toxicology
  - Named an AAP "Best Internet-Based Electronic Product"
- Encyclopedia of Reagents for Organic Synthesis (EROS)



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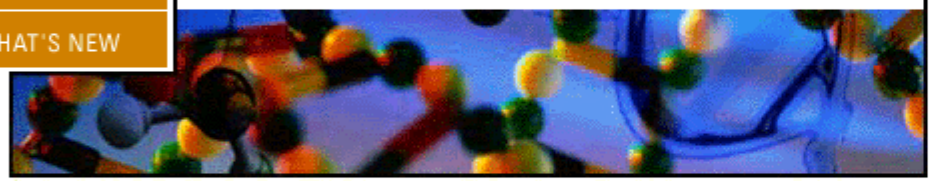

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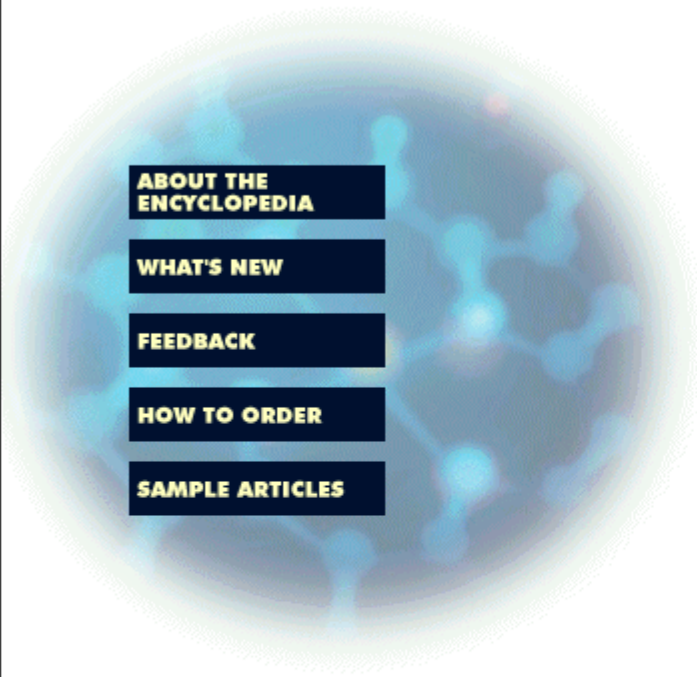

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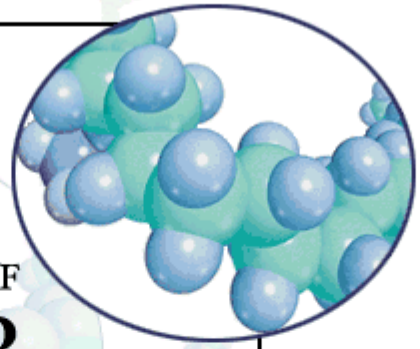

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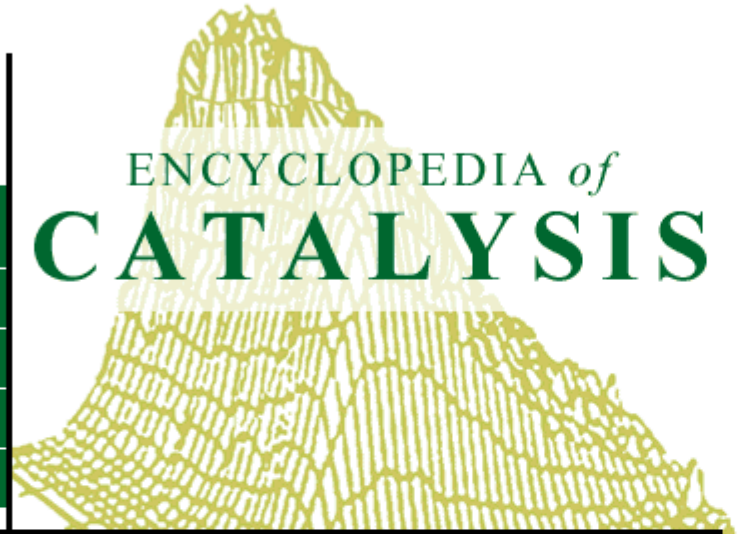

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  - Growing over time
  - Stop by the booth at ACS for a demo

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  - Based on FTEs
  - Prices start at $50/yr
  - Kirk & Ullmann's start at $900/yr

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ISBN: 3527600264 (Electronic) 3527298304 (Print)

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