

The Cativa™ Process for the Manufacture of Acetic Acid

IRIDIUM CATALYST IMPROVES PRODUCTIVITY IN AN ESTABLISHED INDUSTRIAL PROCESS

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Acetic acid is an important industrial commodity chemical, with a world demand of about 6 million tonnes per year and many industrial uses. The preferred industrial method for its manufacture is by the carbonylation of methanol and this accounts for approximately 60 per cent of the total world acetic acid manufacturing capacity. The carbonylation of methanol, catalysed by rhodium, was invented by Monsanto in the 1960s and for 25 years was the leading technology. In 1996 a new, more efficient, process for the carbonylation of methanol was announced by BP Chemicals, this time using an iridium catalyst. This article describes the new process and looks at the ways in which it improves upon the prior technology.

In 1996 a new process for the carbonylation of methanol to acetic acid was announced by BP Chemicals, based on a promoted iridium catalyst package, named Cativa™. The new process offers both significant improvements over the conventional rhodium-based Monsanto technology and significant savings on the capital required to build new plants or to expand existing methanol carbonylation units. Small-scale batch testing of the new Cativa™ process began in 1990, and in November 1995 the process was first used commercially, in Texas City, U.S.A., see Table I.

The new technology was able to increase plant throughput significantly by removing previous process restrictions (debottlenecking), for instance at Hull, see Figure 1. The final throughput achieved has so far been determined by local avail-

ability of carbon monoxide, CO, feedstock rather than any limitation imposed by the Cativa™ system. In 2000 the first plant to use this new technology will be brought on-stream in Malaysia. The rapid deployment of this new iridium-based technology is due to these successes and its many advantages over rhodium-based technology. The background to this industrial method of producing acetic acid is explained below.

The Rhodium-Based Monsanto Process

The production of acetic acid by the Monsanto process utilises a rhodium catalyst and operates at a pressure of 30 to 60 atmospheres and at temperatures of 150 to 200°C. The process gives selectivity of over 99 per cent for the major feed-

Table I
Plants Producing Acetic Acid Using the New Cativa™ Promoted Iridium Catalyst Package

Plant	Location	Year	Debottlenecking or increased throughput achieved, %
Sterling Chemicals	Texas City, U.S.A.	1995	20
Samsung-BP	Ulsan, South Korea	1997	75
BP Chemicals	Hull, U.K.	1998	25
Sterling Chemicals	Texas City, U.S.A.	1999	25
BP Petronas	Kertih, Malaysia	2000	Output 500,000 tonnes per annum

The Cativa Process For The Manufacture Of Acetic Acid

G. Margaret Wells



The Cativa Process For The Manufacture Of Acetic Acid:

Chemical Technologies and Processes Katarzyna Staszak, Karolina Wieszczycka, Bartosz Tylkowski, 2020-07-20 This book is essential reading for scientists and students interested in both organic and inorganic chemical technology. The authors cover the production of chemical reagents as well as trends from adjacent fields including biotechnology and process simulation. *Chemical Technologies and Processes* is of interest to chemical engineers, materials scientists as well as chemists in both academia and industry.

Chemical Technology Andreas Jess, Peter Wasserscheid, 2020-04-06 A fully updated edition of a popular textbook covering the four disciplines of chemical technology featuring new developments in the field. Clear and thorough throughout, this textbook covers the major sub-disciplines of modern chemical technology: chemistry, thermal and mechanical unit operations, chemical reaction engineering, and general chemical technology alongside raw materials, energy sources, and detailed descriptions of 24 important industrial processes and products. It brings information on energy and raw material consumption and production data of chemicals up to date and offers not just improved and extended chapters but completely new ones as well. This new edition of *Chemical Technology: From Principles to Products* features a new chapter illustrating the global economic map and its development from the 15th century until today and another on energy consumption in human history. Chemical key technologies for a future sustainable energy system such as power to X and hydrogen storage are now also examined. Chapters on inorganic products, material reserves, and water consumption and resources have been extended while another presents environmental aspects of plastic pollution and handling of plastic waste. The book also adds four important processes to its pages: production of titanium dioxide, silicon production, and chemical recycling of polytetrafluoroethylene and fermentative synthesis of amino acids. Provides comprehensive coverage of chemical technology from the fundamentals to 24 of the most important processes. Intertwines the four disciplines of chemical technology: chemistry, thermal and mechanical unit operations, chemical reaction engineering, and general chemical technology. Fully updated with new content on power to X and hydrogen storage, inorganic products including metals, glass, and ceramics, water consumption and pollution, and additional industrial processes. Written by authors with extensive experience in teaching the topic and helping students understand the complex concepts. *Chemical Technology: From Principles to Products, Second Edition* is an ideal textbook for advanced students of chemical technology and will appeal to anyone in chemical engineering.

Membrane-Based Technologies for Environmental Pollution Control Parimal Pal, 2020-05-14 *Membrane Based Technologies for Environmental Pollution Control* explains the application of this green technology while offering a systematic approach for accurately utilizing mathematical modeling methods for optimizing system design and scale up. The book provides in-depth coverage of membrane processes, materials, and modules along with their potential application in various pollution control systems. Each chapter provides a systematic approach for dynamic model development and solutions. With this reference, researchers and those responsible for the design of pollution control

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The Chemical Engineer ,1998 **Industrial Chemistry** Mark Anthony Benvenuto,2023-07-04 Industrial Chemistry examines the chemical processes performed in industry and looks at how they affect our livesby discussing the by products pollution waste generation and attempts at making processes more ecologically friendly or greener The author establishes connections between basic chemistry and the chemical processes that are used in real life This 2nd Edition includes expanded and revised chapters e g on fuel production **Frontiers** ,2007 **Chemical Week** ,2008 *Descriptive Inorganic Chemistry* Geoff Rayner-Canham,Tina Overton,2014-09-19 This bestselling text gives students a less rigorous less mathematical way of learning inorganic chemistry using the periodic table as a context for exploring chemical properties and uncovering relationships between elements in different groups The authors help students understand the relevance of the subject to their lives by covering both the historical development and fascinating contemporary applications of inorganic chemistry especially in regard to industrial processes and environmental issues The new edition offers new study tools expanded coverage of biological applications and new help with problem solving Handbook of Petrochemicals and Processes G. Margaret Wells,1999 The Handbook of Petrochemicals and Processes gathers together in one volume the most frequently needed information on all major petrochemicals It will prove an invaluable source of reference for industrial chemists chemical engineers and industry professionals as well as librarians and information centres concerned with the petrochemical industry BOOK JACKET *Nafta* ,2003 Chemistry and Industry ,2008 *Rendiconti Lincei* ,2007

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Organotransition Metal Chemistry John F. Hartwig, 2010-02-10 Based on Collman et al s best selling classic book Principles and Applications of Organotransition Metal Chemistry Hartwig s text consists of new or thoroughly updated and restructured chapters and provides an in depth view into mechanism reaction scope and applications It covers the most important developments in the field over the last twenty years with great clarity with a selective but thorough and authoritative coverage of the fundamentals of organometallic chemistry the elementary reactions of these complexes and many catalytic processes occurring through organometallic intermediates making this the Organotransition Metal Chemistry text for a new generation of scientists **Applied Science & Technology Index** ,1996

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