SPECIALTY ZEOLITES IN CATALYSIS, 2002-2020: INTERNATIONAL, COMMERCIAL AND TECHNICAL PROGRESS – A NEW ERA!

MULTI-CLIENT STUDY PRESENTATION

(study completed February 2014)
SPECIALTY ZEOLITES IN CATALYSIS, 2002-2020: INTERNATIONAL, COMMERCIAL AND TECHNICAL PROGRESS – A NEW ERA!

I. BACKGROUND

The Catalyst Group Resources (TCGR) has been recognized as the definitive source for information on the use of specialty zeolites in catalysis throughout the 1980’s, the 1990’s and when completing TCGR’s last benchmarking report Specialty Zeolites in Catalysis: 1992-2001 in June, 2002. It is now 2014 and this update report has been generated to capture the global, commercial and technical changes that have occurred over the last decade, defined as the use of zeolites beyond A, X, and Y.

In addition to documenting the historical developments of 2002 to 2012, this new report, for the first time, takes a forward looking forecast into the future (2013-2020). There is a powerful reason for this change! Zeolites, already a robust and selective catalyst, will no doubt play an increasing role in energy efficiency and therefore in the reduction of greenhouse gases (GHGs) generated in process reactions.

In highlighting the importance of zeolites to the global economy, the World Technology Evaluation Center Inc. (WTEC) on behalf of the National Science Foundation (NSF) and in support of the National Science and Technology Council (NSTC) recently released a report entitled Nanotechnology Research Directions for Societal Needs in 2020 (see http://wtec.org/nano2/).

In that study, coined “Nano 2,” it was stated by TCGR (Chapter 10, p. 346) that 30-40% or more of global catalyst products, valued at $18-20 BIL/year (at that time), incorporated modern nanotechnology, in which zeolites with tailored framework structures are used for shape selective chemicals and fuel processing. In refining and petrochemicals (aromatics) production, this percentage is significantly higher. Thus, keeping detailed track of this expanding technology and its process developments is of vital importance to industry. This is highlighted in Figure 1 (page 2).

In our 2002 report, we focused on providing a detailed capacity by process buildup analysis of specialty zeolite catalysts usage in refining, petrochemicals and fine and intermediate chemicals. It provided significant detail on the use of these catalysts in each application by company. That analysis, due to its breadth and depth, made up the bulk of the last report. In this 2014 update, “Specialty Zeolites in Catalysis, 2002-2020: International, Commercial and Technical Progress – A New Era!,” we update yet condense this coverage since the detail can be obtained from the previous report on technical application (see Figure 2, page 3). This new volume spends time on new uses, or more rapidly expanding market segments, of interest to zeolite and/or catalyst producers.
This report does not aim to duplicate the same scope of coverage, but rather compares and contrasts 2002 findings, adding new applications and commercial competitive perspectives that have changed. In fact, so that subscribers in this update are brought up to speed, TCGR has made the 2002 report available for a nominal additional fee.

For TCGR’s reports in the zeolites area, we have the assistance of the world’s most renowned zeolite experts. The 2002 report was authored with the assistance of Dr. Wolfgang Holderich, University of Aachen, ex BASF and Dr. Art Chester, formerly of ExxonMobil (retired), who also obtained oversight from other leaders. In earlier studies, other contributors have been Dr. George Kokotailo, formerly of Mobil, Dr. Sigmund Csicsery, formerly of Chevron Research, and Dr. Tomoyuki Inui, retired from the University of Tokyo. For this 2014 update, we have continued our usage of the world’s leading technical and commercial experts including Bill Borghard (ex ExxonMobil), Jim D’Auria (ex UOP) and Vince Durante (ex Sunoco and BASF), among others. As an active participant in the International Zeolite Association (IZA) through its Dialog Group®, TCGR’s expertise is well-recognized by all industry participants.

Figure 1
Examples of Nanotechnology in Commercial Catalysis Products for Applications in Oil Refining 2010 (Nano2)
II. THE NEED FOR THE STUDY

Not surprisingly, this is a high growth market segment. When last benchmarked in 2002, applications growth exceeded +12% annually! Equally important, specialty zeolites and specialty zeolite catalysts commanded both a premium price and margin due to their highly selective and value-added contribution in production, advancing both yield and selectivity. Therefore, applications R&D and expansion of specialty zeolites usage are expected to continue to be a high investment priority.

Information from other sources is “sparse” at best because detailed knowledge and participation within these applications is a prerequisite to understanding both the market and the business in order to define the opportunities. As a result of the nature and importance of this sector, it is shrouded in industrial secrecy. The Catalyst Group Resources (TCGR) is uniquely positioned with the skill and knowledge to assemble this report update.
Two growth segments in zeolites come immediately to mind and are worthy of special cameos: 1) environmental catalysts; and 2) the growth in Asia/Pacific, which is more sophisticated in China in particular. To highlight these examples, we mention the increasing use of metallo-zeolites in diesel automotive oxidation catalysis – but there are others. On the Asia/Pacific front, we highlight the expanding use of Sinopec’s licensed deep catalytic cracking (DCC) process for the selective production of olefins, but there are others in commercial/pilot development (e.g., catalytic pyrolysis).

There is a periodic need for this timely study to benchmark the progress, as well as document the commercial opportunities available for the future.

This newly updated report “Specialty Zeolites in Catalysis, 2002-2020: International, Commercial and Technical Progress – A New Era!” complements an ongoing portfolio of similarly well-received studies TCGR has delivered to clients over recent years. This growing experience demonstrates TCGR’s unique capability, resources, and expertise to deliver exceptional insight.

Recent multi-client reports and studies from our current membership-directed programs include:

- The Industrial Adsorbents Business: Commercial Strategy, Technical and R&D Assessment in Refining, Chemicals/Syngas, Natural Gas and Industrial Gases (July 2013)
- Unconventional Catalytic Olefins Production: Commercial Vision and Breakout? (January 2013)
- Advances in Catalytic Production of Olefins (April 2012)
- Advances in Refinery Cracking Catalysts and Processes (June 2012)

III. SCOPE AND METHODOLOGY

As depicted in the report’s Table of Contents (see pages 6-13), TCGR’s study begins by completing an overview of the current industry players and the commercial landscape (Section III). It presents an understanding of licensed processes, applications and product properties and provides a commercial review of the recent past (with historical points) as well as a description of the current competitive environment.

The market size and growth of specialty zeolite catalysts by process and industry have been evaluated, updated and shown by industry segment (e.g. refining, petrochemicals/aromatics, chemicals, fine chemicals, intermediates, and environmental) in Section IV. As described earlier, past/historical information has been updated and condensed, whereas existing applications that are important growth areas in the future are documented in more detail.
Section V, New Applications and Growth Markets ("Cameos"), consists of cameos on two focused (i.e., charter subscriber directed) growth segments: 1) Asia/Pacific (China); and 2) environmental. The first is geographically focused, the second, applications focused.

Section VI, Recent R&D Advances in Zeolites 2002-2012, captures developments over the last decade in newer zeolites by type, a patent analysis for this period by application and company, as well as a summary of future trends envisaged derived from this set of information and a detailed technical knowledge of the field.

Section VII, Commercial Strategy, Competition and Barriers to Entry, provides a more insightful analysis of critical points in commercial developments. Issues of manufacturing capacity, process licensing and global positioning are evaluated. This section is expanded and more interesting due to the impacts of the forward looking timeframe to 2020.

TCGR’s unique background and historical development roots in zeolites (ex Union Carbide) provides an unparalleled capability and skill level in this study area. Deep expertise in materials science and process engineering means the ability to provide insights beyond other sources that do not have the industrial experience TCGR and our Dialog Group® can provide.

For those that understand and appreciate this study undertaking, you will know how important and critically timely this evaluation is! We are standing at a critical crossroads as it pertains to the path towards 2020. The next 5-10 years are certain to be telling. Thus, TCGR’s study is warranted.

In order to heighten the value-added from study participation, TCGR worked with “charter” subscribers (i.e., those who signed up for the study before its launch) in order to define the scope of the report by delineating areas of particular interest for inclusion in the assessment.

TCGR has also made immediately available the 2002 edition of the report, entitled Specialty Zeolites in Catalysis: 1992-2001, for the nominal fee of $2,500. This provides a basis for subscribers to obtain a fundamental understanding of the industry’s history, players, products and environment.
SPECIALTY ZEOLITES IN CATALYSIS, 2002-2020: INTERNATIONAL, COMMERCIAL AND TECHNICAL PROGRESS – A NEW ERA!

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IV. QUALIFICATIONS

The Catalyst Group Resources, a member of The Catalyst Group, works with clients to develop sustainable competitive advantage in technology-driven industries such as chemicals, refining, petrochemicals, polymers, specialty/fine chemicals, biotechnology, pharmaceuticals, and environmental protection. We provide concrete proven solutions based on our understanding of how technology impacts business.

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We have built our consulting practice on long-term client relationships, dedication, and integrity. Our philosophy is clear and focused:

*We Provide the "Catalysts" for Business Growth by Linking Technology and Leading-Edge Business Practices to Market Opportunities*
V. DELIVERABLES AND PRICING

This report is timely and strategically important to those industry participants and observers considering investment, as well as to process technology companies evaluating the specialty zeolite markets. TCGR’s report, based on technology evaluations, market assessments and interviews with key players goes beyond public domain information. As a result, subscribers are requested to complete and sign the “Order Form and Secrecy Agreement” on the following page.


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