



A ChevronTexaco Company

## TECHNOLOGY MARKETING

High Thru-Put  
Zeolite  
Manufacture





# Zeolite



*ZeolitePlus* is the preferred route to both powder and extrudate.



## Benefits and features

### Unique manufacturing technology

- Wide range of zeolite products and silica-to-alumina ratios
- High reactor thru-put and small footprint for easy revamp
- Conventional raw materials

### Lowest capital and expense costs

- Fewest process steps
- Faster thru-put
- Lowest raw materials cost
- Integrated extrudate or powder products

### Environmentally friendly process

- Less organic waste
- Less inorganic waste

# Plus

The low cost route to quality zeolites



## High product yields

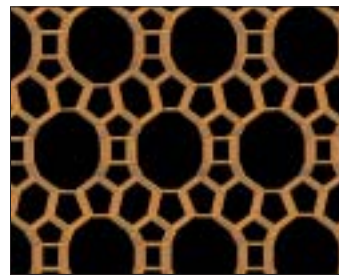
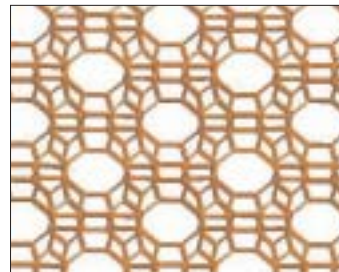
- Less template required
- High inorganic conversion

## Mild process needs

- Temperature
- Pressure
- Metallurgy

## Proven quality zeolites and catalysts

- Semi-works operations
- Properties meet or exceed standard specifications
- High crush strength extrudate
- High activity catalysts



service

experience

expertise

next steps >>>

## Questions and Answers About *ZeolitePlus* Technology

### What Is *ZeolitePlus*?

*ZeolitePlus* is Technology Marketing's new proprietary technology for manufacturing a wide range of zeolites.

### Who Is Technology Marketing?

A division of ChevronTexaco, Technology Marketing develops, sells and licenses catalysts and technology for refining industries worldwide.

### What Other Technologies Does Technology Marketing Offer?

Through joint ventures with ABB Lummus Global and Grace Davison, Technology Marketing licenses world leading refining technologies and sells proprietary catalysts for ISOCRACKING hydrocracking technology, ISODEWAXING lube base oil technology, RDS, VRDS (residuum hydrosulfurization) OCR and UFR (metals removal technology for high sulfur residuum).

### What Are the Advantages of *ZeolitePlus* Compared to Conventional Methods?

*ZeolitePlus* simplifies and reduces the number of steps used in zeolite manufacture. This leads to lower capital and operating costs and a more environmentally benign operation.

### Why Is the Capital Cost Less Than Conventional Methods?

*ZeolitePlus* uses Technology Marketing's proprietary process technology, increasing the cost-effectiveness of the equipment, and giving increased zeolite yields.

### Why Is the Operating Cost Less Than Conventional Methods?

Operation cost is less as a result of reduced batch time and more effective use of template and other raw materials. The cost of organics per pound of zeolite product for a number of specialty zeolites is also reduced.

### How Is *ZeolitePlus* More Environmentally Sensitive?

*ZeolitePlus* requires a smaller footprint than conventional processes. Additionally, with enhanced yields, there is considerably less organic and inorganic waste for disposal. The use of lower quantities of organic template compounds makes containment of organic vapors much easier.

### What Is the Quality of the Zeolites Prepared Using *ZeolitePlus*?

*ZeolitePlus* yields high quality zeolites in either powder or extrudate form. The technology demonstrates great flexibility to meet the physical property requirements of the user. Catalyst performance matches or exceeds the performance of commercial catalysts for both refining and petrochemical processes.

### What Type of Zeolites Can Be Manufactured With *ZeolitePlus*?

A wide range of zeolites and molecular sieves can be prepared using the technology, including Beta and ZSM-5. Either powder or extrudate forms can be manufactured using *ZeolitePlus*.

### At What Scale Has Technology Marketing Demonstrated *ZeolitePlus*?

Beta zeolite was prepared at a 200 pound/batch scale while ion-exchange and calcinations were demonstrated at the 1,000 pound scale.

### What Are the Choices for Extrusion?

Most conventional extruders can be used.

### What Is the Performance of Catalysts Made from *ZeolitePlus* Zeolites?

Different zeolitic catalysts made using *ZeolitePlus* give good or exceptional performance as compared to commercial reference catalysts in bench scale pilot evaluations. Superior results were demonstrated for a beta zeolite catalyst using a one cubic foot slipstream pilot plant at an operating petrochemical manufacturing plant.

#### What Are the Process Requirements for *ZeolitePlus*?

These depend on the specific zeolite application, but in general the crystallizer is operated at the same or less severe conditions than used for conventional synthesis of the target zeolite.

#### What Size Samples Can Technology Marketing Supply and How Soon?

Our 200 pound/batch semi works pilot plant is now available for preparing zeolite powders. Several pound samples from this can be exchanged and calcined either at Technology Marketing, or at the customer's facility, particularly if larger quantities are required.

#### Will Technology Marketing Provide a Detailed Process Design and What Is the Cost?

Technology Marketing will provide process design for the crystallizer section of the plant and cooperate with the client to determine the requirements of the ancillary equipment needed for the finished product.

#### What Are the Commercial Terms for Licensing *ZeolitePlus*?

Commercial terms vary with each application of the technology. The commercial package will include process design, technical service as well as a royalty for right to practice. Either a fully paid or running royalty will be offered.

#### Which Conventional Zeolite Manufacturing Equipment Can Be Used With the *ZeolitePlus* Technology?

Depending on the type of zeolite manufactured, much of the existing process equipment, including mixers and solid handling equipment can be used in revamp applications.

#### Are Samples of *ZeolitePlus* Zeolites Available?

Technology Marketing will provide lab samples for customer evaluation. Larger pilot plant scale samples will be made on a contract basis to your specification.

#### Will Technology Marketing Release Sufficient Details for Customer Cost Analysis?

Technology Marketing will work with the customer under confidentiality agreement to provide cost and expense bases.

#### Does ChevronTexaco Use *ZeolitePlus* in Their Own Operations?

Since this technology is just being introduced, *ZeolitePlus* based commercial zeolites or catalysts are not yet available. In the future, we expect that our catalyst suppliers will be turning to this more cost-effective technology for manufacturing zeolites.

#### How Do Customers Contact Technology Marketing?

For more information contact:

**New Business Development**

**Technology Marketing**

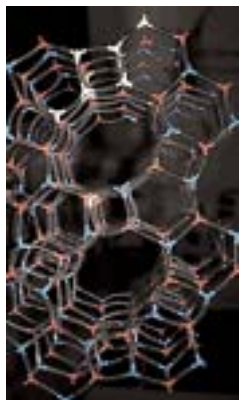
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