White paper

ExxonMobil

Creating a particle of difference

Making innovative catalysts to trigger a rection in chemical, gas and refining processes.

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When you are creating high-quality petrochemical end products, you must first trigger a reaction. The keys that unlock this process are catalysts developed at our state-of-the-art facility in Clinton, New Jersey.

Our scientists work with customers in Clinton and at their facilities around the world to conceive, create and test ExxonMobil catalysts to ensure high quality and exceptional performance before deployment.

Forming the catalysts

Creating a catalyst begins with creating the active materials through hydrothermal synthesis. This process combines several raw materials into a slurry that is poured into a reactor. The reactor applies heat and agitates the material, which results in the formation of catalytic crystals.

The mulling process takes the extrudate, now dried into powder form, and mixes them with binding agents and forms a doughy paste. Engineers put the paste through an extrusion machine, where it is formed into long thin strands, like spaghetti. Catalysts can be extruded in different sizes and shapes – changing the shape can change the performance attributes of the catalyst.

Now that the catalysts have been formed, they enter a phase of calcination, which is a heating process. Inside the kiln, the catalyst is constantly increasing in temperature, from start to finish, burning off impurities to create a more pure form of the catalyst.

Confirming exceptional performance

Once they are formed our catalysts go through an exhaustive testing process. The next step is high throughput chemisorption (HTC), a measuring process that looks at the quality and availability of metals in the catalyst. These measurements give engineers an estimate of the product's catalytic performance.

Once the catalytic characterization of the catalyst has been determined, skilled ExxonMobil engineers test the physical properties of the catalyst. The modulus of rupture equipment measures how the catalyst performs under pressure. This is a real-life simulation that allows scientists to determine how the catalyst will cope in the environments in which it will eventually be used

Optimizing physical properties

Catalysts that successfully pass through the initial development, processing and testing phases are subjected to further tests to ensure they have optimum physical properties, including a test that evaluates surface area.

After both catalytic and physical characterization has been determined, the catalysts then go through catalyst activity tests that measure acidity, selectivity and metal activity. Multiple rounds of simulations mimic a real chemical or refining process to prove the catalysts trigger a reaction and ensures consistent, high-yield performance.

Production on a global scale

When deemed fit for production, the catalysts are sent to ExxonMobil's Beaumont laboratory for first production on a commercial scale, though we have a range of options to commercially produce around the world. If commercial-scale production is successful, global-scale commercial production takes place. If the commercial scale up is unsuccessful, design work continues until the desired specifications are met.

Ensuring optimum performance

Quality control to ensure optimum performance is an important part of our commercial process and is performed at our ExxonMobil Global Chemical Technlogy Laboratory. Once evaluated, the catalysts are shipped to customers around the world to be used in innovative gas, chemical and refining processes.

Designed with you in mind

From start to finish, our extensive catalyst creation process is designed with you in mind. Because of the thorough analysis of our expert staff, you can trust that when your products need a reaction, our innovative catalysts will be there to trigger one.

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