

Catalyst Testing and Troubleshooting

Industry

Chemicals and Polymers

Region

Americas

Intertek Solutions

Analytical Laboratory Services

“The problem solving capabilities of Intertek enabled Air Products to quickly resolve a problem for a critical manufacturing operation.”

Kathy Hayes,
Air Products and Chemicals

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Air Products and Chemicals, Inc. produces amines for manufacture of rigid and flexible polyurethane foams. These amines are produced via catalytic hydrogenation in a multi-purpose plant. Process variations that increase cycle time can impact production schedules and logistics, affecting the business. During one such hydrogenation run, a plant production engineer and a process chemist observed that a recent batch of heterogeneous catalyst from their supplier was not performing to requirements and was causing missed production targets. To avoid further schedule disruptions, the catalyst quality issue needed to be resolved quickly. Air Product’s process chemist quickly contacted Intertek’s Analytical Science Americas laboratory (Intertek ASA) for help in identifying test methods that would determine the origin of the degraded performance of the heterogeneous catalyst.



ASA scientists conducting specialized, problem solving analytical testing



Industry challenge

The problem heterogeneous catalyst had an unknown impurity, not present in previous batches which had met historic specification requirements. A specialized, problem-solving, analytical laboratory approach was needed to characterize the unknown material. Without an accurate identification of the mysterious contamination, a solution to the batch issue would be much more difficult to resolve with confidence.

The Solution

Intertek ASA’s experts performed a series of materials analysis tests to identify an impurity in the new lot of heterogeneous catalyst that had not been present in previous lots. A specialized thermal method coupled with infrared spectroscopy was used to detect decomposition of this impurity and to identify the by-product of the decomposition. The impurity was identified prior to decomposition using X-ray powder diffraction, which was also used to confirm the absence of the impurity after the thermal analysis. The contamination had been identified with confidence.

Supplied with this important information, Air Products personnel approached the catalyst supplier and shared the Intertek test data with them. The catalyst vendor quickly checked the production time period for the suspected heterogeneous catalyst batch, and determined that an operational change had resulted in the impurity being introduced. Further problems were avoided when the same impurity was detected in a second heterogeneous catalyst batch waiting to be used in the Air Products process. Air Products’ heterogeneous catalyst supplier quickly corrected the problem by providing fresh batches of in-specification heterogeneous catalyst, avoiding any further disruptions to Air Products’ amine production. The XRD analysis provides a tool to characterize future batches of heterogeneous catalyst and to guarantee consistent heterogeneous catalyst performance.

Air Products were pleased with the rapid, accurate and responsive work conducted by Intertek scientists, saving lost production time and helping to protect product quality specifications.