Dr. M. Sam Mannan, center director, is an internationally recognized expert on process safety and risk assessment. Mannan, Regents professor and the T. Michael O'Connor Chair I in the Artie McFerrin Department of Chemical Engineering at Texas A&M University, is a registered professional engineer and certified safety professional. In addition to his many professional honors and achievements, Mannan has served as a consultant to numerous entities in both the academic and private sectors. He also has testified before the U.S. Congress on multiple occasions, lending his expertise on matters of national security as it relates to chemical safety and infrastructure.

For more information about testing capabilities, contact:

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Established in 1995 and headquartered in the Jack E. Brown Engineering Building, the Mary Kay O'Connor Process Safety Center is dedicated to enhancing safety in the Chemical Process Industry.

The center conducts various educational endeavors aimed at "making safety second nature" to everyone in the industry. In addition, center researchers work to develop safer processes, equipment, procedures and management strategies to minimize losses.

The center also serves as an information resource base for process safety, acting as a library and software laboratory. The center provides consultation for small and medium enterprises, government agencies, institutions, local emergency planning committees and other agencies.

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Process Safety Laboratory

Experimental Testing Capabilities

Mary Kay O'Connor
Process Safety Center

TEXAS A&M ENGINEERING

Reaction Calorimetry & *In-situ* FTRI Reaction Analysis

Our reactive chemical laboratory is equipped with a state-of-the-art Reactor Calorimeter, RC1e. This calorimeter can be used for process optimization and to perform experimental testing that provides data for conducting systematic assessments of risk due to potential loss of control over chemical reactions.

This RC1e is equipped with an *in-situ* FTRI probe (React IR™), that provides real-time information about the chemical species involved or formed during the progress of a chemical reaction (*i.e.*, intermediate products). This probe can detect the potentially hazardous reactant accumulation. In combination with the data from real-time calorimetry, the FTRI probe can be used for a comprehensive evaluation of the reaction system, selection of the operating conditions, assess safety of process changes, *etc.*

RC1 Calorimeter

APTAC

Adiabatic Reaction Calorimetry

Our laboratory is also equipped with an Automatic Pressure Tracking Adiabatic Calorimeter (APTAC), which can be used for the evaluation of the thermal runaway behavior of reactive systems.

The APTAC can operate under different modes including *heat ramp, isothermal,* and *heat-wait-search* modes (HWS). When operating under HWS mode, the APTAC can detect and track exotherms at heat generation rates as low as 0.04°C/min and up to about 400°C/min. This calorimeter can use sample cells of different materials including Hastelloy, titanium, stainless steel, and glass. Its pressure range goes from vacuum to 2,000 psi.

The information obtained from the APTAC can be used for conducting kinetic and thermodynamic studies, determining the thermal stability of a reactive system, providing valuable data for pressure relieve valves design, *etc.*

Dust Explosion Testing

The center also has a 36-L vessel that can be used to evaluate the explosibility characteristics of dust samples and hybrid mixtures. With this equipment we can determine the hazard class for the analyzed sample (K_{St} values), the Lower Oxygen Concentration (LOC), and the Minimum Explosible Concentration (MEC). These results are valuable for conducting a hazard assessment of process/operations that involve handling of dust particles.

Our equipment has been carefully calibrated and its performance has been evaluated using samples from Round Robin tests. The results obtained show an excellent agreement with other standard equipment (*i.e.*, 20-L and 1m^3 vessels), which confirms the validity of our results.

36-L Dust Explosion Apparatus

Other Testing Capabilities

The areas of expertise of the MKOPSC in experimental safety include reactive chemicals, dust explosions, flammability of gases and liquid aerosols. In addition to the standard tests mentioned, the MKOPSC can develop tailored experimental setups to meet the needs of our clients. Please contact us for details.