

PHI-TEC II *Fact Sheet*

Adiabatic Calorimetry Testing

Scaled testing of chemical mixtures may be required when designing new chemical production processes and Emergency Relief Systems (ERS). This is particularly important when working with materials that could undergo exothermic “runaway” reactions. Such materials include the ones used in specialty chemicals, coatings and pharmaceutical manufacturing.

Our in-house process safety lab has a variety of analytical test equipment which includes an adiabatic reaction calorimeter. We utilize the PHI-TEC II manufactured by H.E.L. Ltd., which is the required apparatus to conduct these tests.

Why the PHI-TEC II is Different

Due to the low thermal inertia of the test apparatus, the data can be used directly for scale up purposes without further manipulation. In a low thermal inertia test device, the test method is nearly adiabatic. This is achieved by assuring that the heat capacity of the test cell is much smaller than the heat capacity of the test sample, which is typical for full-scale industrial applications.

The heat generated during the test in the relatively small sample (10 mL to 100 mL) sample is continuously measured and heat is applied to the outside of the test cell through heating elements to further achieve near adiabatic test conditions.

Typical information collected from the tests include the character, rate and energy release rates of the chemical reactions, which are essential for safe process design. Data can be used to make assessments about thermal stability under storage/transportation condition, pilot plant and full-scale process design.

Our PHI-TEC II is equipped with computer-controlled metering pumps, which allow to make multiple feeds even at high pressure. In addition, different mechanisms for mechanical agitation (magnetic and direct drive) are available so that mixtures containing solids (e.g. catalyst pellets) can be effectively stirred during the test.

BENEFITS OF PHI-TEC II

- + Data for vent sizing under runaway conditions based on ISO 4126-10 or DIERS methodology
- + Accurate test data that can be scaled from the bench to pilot and full plant scales
- + Measurement of pressure and temperature rise rates for exothermic reactions
- + Temperature change tracking up to 200°C/min and pressure tracking up to 100bar/min

How Can We Help You?

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