

Catalysts, cements & pharmaceuticals



Catalyst Screening

Although many reactions run better when catalysed it is very difficult to know the best catalyst to use. A recent survey of catalyst manufacturers suggested that in excess of 1000 versions of alumina supported platinum exist. This raises questions. Which is the best system? What are the best conditions?

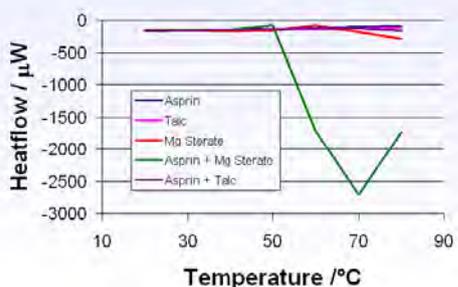
The ability to measure both kinetics and thermodynamics simultaneously allows users to select the parameters which are important to their process and monitor those as the catalyst is changed.

High pressure vessels (up to 10bar) now available with the Micro Reaction Calorimeter allow gas phase reactions (e.g. hydrogenation) to be examined. The μ RC can be supplied with a high pressure transducer for direct measurement of gas uptake during reaction or gas evolution measurement.

Our μ RC-Pro, dedicated kinetics package gives users the ability to easily import data directly into a specialist kinetics analysis software and then to model the reaction using a wide range of purpose designed systems. μ RC-Pro is compatible with the CISP software products which allows full-scale models of reactions to be implemented for reactor modelling, runaway prediction and other useful parameters.

Excipient Compatibility Screening

The three temperature modes of the μ RC make it a very useful and flexible tool for excipient compatibility assessment. Using the device in an isothermal mode allows auto-catalytic and slow reactions to be monitored.



Comparison of the thermal response between Aspirin and two standard excipients, Talc and Magnesium Sterate

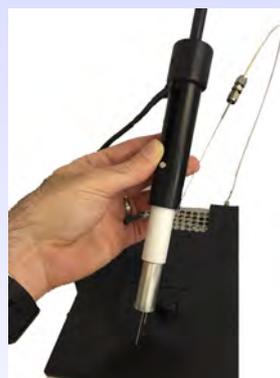
Step-isothermal calorimetry will provide an accelerated method by which thermal stability assessments can be reduced from weeks to hours. Temperature scanning can also be used to detect reaction onset. Working as a macro-scale DSC, the μ RC can provide onset information where lack of material consistency requires the use of larger volumes of material.

Adhesive Curing

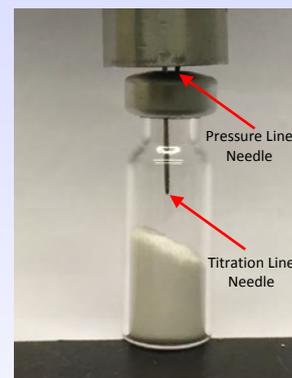
Materials studies including adhesive curing, cement hydration and other such processes can be easily studied using the micro reaction calorimeter. The disposable vials make the system an ideal tool for chemistries where materials harden, set or gel. Being able to study these processes as a function of temperature is an ideal way of gaining valuable thermokinetic data which is otherwise unavailable.

Simultaneous Titration & Pressure Measurement

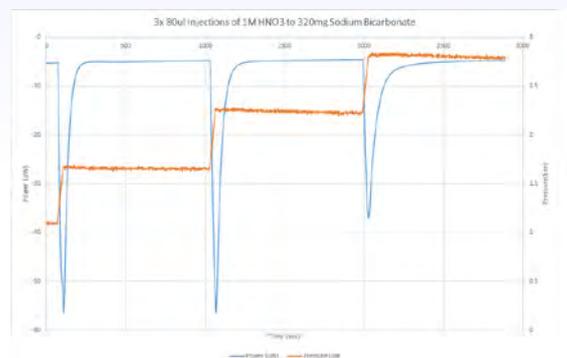
The μ RC is supplied with a standard titration tower for automatic addition and utilises a fixed needle reusable syringe. The syringes are available in 100 μ L and 250 μ L volumes. An optional syringe tower is now available that incorporates a second 22 gauge needle, this needle is fixed in place next to the standard titration syringe and connects via a 1/16" Swagelok connector to the pressure transducer. This arrangement is ideally suited to users requiring simultaneous titration and pressure measurement.



Syringe tower with pressure needle



Standard crimp top sample vials with natural rubber PTFE faced septa lid hold pressure up to 5bar.



Pressure and heat data from a titration experiment consisting of three, 80 μ L injections of 1M HNO₃ to 320mg of Sodium Bicarbonate
 $\text{NaHCO}_3 + \text{HNO}_3 \rightarrow \text{NaNO}_3 + \text{H}_2\text{O} + \text{CO}_2$