

DRC A New Reaction Calorimeter for the Optimization and the Safety of Chemical Reaction.

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Considering an industrial chemical reaction, it remains very important to evaluate thermal hazards by appropriate and adequate laboratory tests to obtain information on the rates and the quantities of heat generation. One source to obtain this necessary information, is through experimental determination and reaction calorimetry.

SETARAM is commercializing a reaction calorimeter, called DRC. It is a differential instrument working in isoperibolic mode. Two reactors are connected in parallel. They have a thermostated jacket in which flows a heat exchange fluid controlling the temperature inside the calorimeter. The differential assembling enables to get rid of parasite heats which are not related to the reaction.

Three important thermodynamic data can be determine using the instrument: the heat of reaction of a liquid + a liquid or a liquid + a solid, the heat capacity of a solvent or a mixture and a theoretical value of the increase of temperature in adiabatic mode. It is possible to determine the heat capacity before, during and after the chemical reaction. The calculation of the heat capacity C_p in isoperibolic mode is based on the heat balance - of the calorimeter - obtained during an electrical calibration, which is produced in the measuring reactor.

DRC is very easy and fast to use. It is a screening tool used to obtain rapidly and systematically important thermodynamic data at low cost.

Some examples will be given to illustrate the possibility of the new reaction calorimeter. The way to calculate C_p will be explained.