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INTRODUCTION OF A NEW REACTION CALORIMETER CALLED DRC.

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Reaction calorimetry is an important tool used to determine important calorimetric data which are needed for the development and safety of industrial process.

A new reaction calorimeter has been developed by AVENTIS and built by SETARAM. The DRC is a differential instrument. Two reactors are connected in series. They have a thermostated jacket in which flows a heat exchange fluid controlling the temperature inside the calorimeter. It works in isoperibolic mode, that it to say that the thermostated jacket is at a constant temperature.

The reaction to be studied is undertaken in the measuring reactor. In the second reactor, an inert solvent is placed and used as a reference. Temperature difference is measured between the two reactors using respectively a 100 Ohm platinum resistance thermometer. In the measuring reactor, there is also a Joule effect probe which is used to calibrate 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 balloon.

Therefore, the DRC is very easy and fast to use. It is a screening tool used to obtain rapidly and systematically important thermodynamic data.

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