

## Theory and uses of calorimeters and thermal analyzers

### Audience

- **Standard training sessions** - scheduled :
  - All users or responsible for SETARAM thermal analyzers or calorimeters
- **Customized training sessions** :
  - Any person involved in thermal analysis or calorimetry data interpretation

### Standard trainings contents

Each part of the **instrument studied in the course is described in detail** so that the trainee understands all the functions and can hence make optimal use of it.

The **precautions for use** are described, as appropriate for the device or accessories used (crucible, cell, atmosphere, etc.). One or more **experiments** will be performed in the different configurations of the instrument, under the supervision of the instructor.

The various **software applications** available for the instruments are reviewed. Aspects of **preventive maintenance**, which serves to maintain the instrument in optimum conditions for use at all times, shall be addressed, followed by an introduction to **corrective maintenance**, which involves the replacement of certain components of the instrument (e.g. replacement of a thermocouple, or a muffle in the case of Setsys).

### Customized trainings contents

The customized training sessions duration **and contents are firstly discussed with the customers**. Topics not only concern instruments and techniques that are already in the schedule. They can focus **on selected application fields**. In that case, a large part of the training is dedicated to thermal data interpretation.

#### Examples:

- *Kinetics interpretation of thermal data*
- *Thermal behavior of food products*
- *Calorimetric methods applied to the study of batteries*
- *Calorimetric methods for the stability and compatibility of pharmaceutical compounds*
- ...

### Training Sessions Schedule

Topic	Price*	Language	Duration	Dates	
				1 <sup>st</sup> session	2 <sup>nd</sup> session
Thermogravimétrie appliquée à Setsys TGA	1 980 €	French	3 days	19 - 21/03/14	24 - 26/09/14
Thermogravimetry applied to Setsys TGA	1 980 €	English	3 days	21 - 23/05/14	08 - 10/10/14
Calorimetry applied to C80	1 320 €	English	2 days	27 - 28/03/2014	
Calorimétrie appliquée au C80	1 320 €	French	2 days	24- 25/03/2014	
DSC (DSC131 evo)	1 320 €	French	2 days	12 - 13/05/2014	
DSC (DSC131 evo)	1 320 €	English	2 days	06 - 07 /10/2014	
MicroDSC evo (III et VII)	1 320 €	French	2 days	27 - 28/11/2014	
MicroDSC evo(III and VII)	1 320 €	English	2 days	01- 02/12/2014	
Thermogravimétrie appliquée à Labsys TGA evo	1 320 €	Anglais	2 days	17- 18/03/2014	
Thermogravimétrie appliquée à Labsys TGA evo	1 320 €	French	2 days	17 - 18/11/2014	
TMA appliquée à SetsysTMA	1 320 €	French	2 days	05 - 06/02/2014	
SENSYS Evo TG DSC	1 320 €	English	2 jours	03 - 04/06/2014	
SENSYS Evo TG DSC	1 320 €	French	2 days	04 - 05/11/2014	

*\*Training for one person, VAT excluded, lunch included*

Price of the customized sessions organized on SETARAM site is **750 € per day per person**.

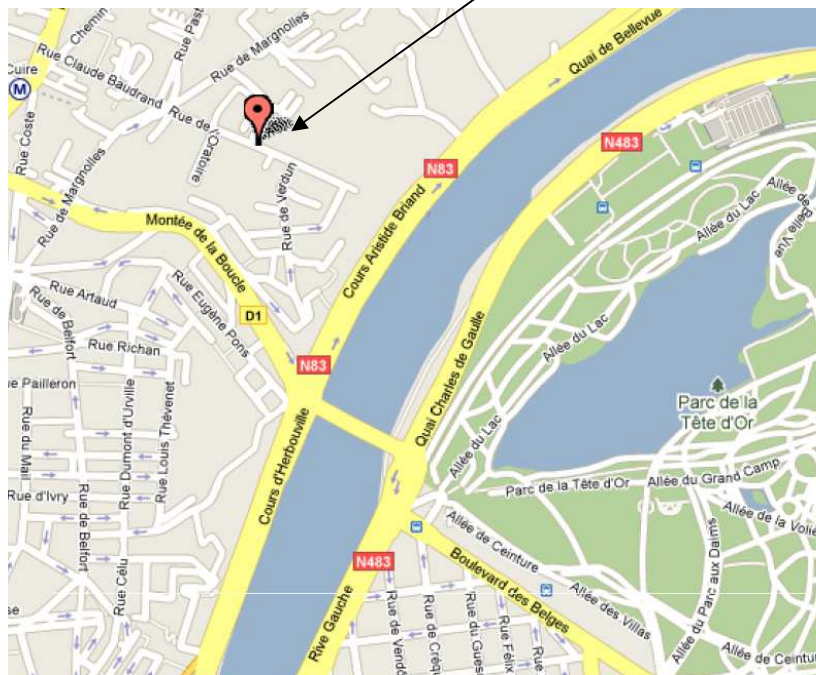
Price of the customized sessions organized on customer site is **1 000 € HT per day per person**, + travel and living expenses.

### Instructors

The engineers and technicians specialized in the concerned instrument or technique.

### Training venue

In the SETARAM Applications Laboratory, 7 rue de l'Oratoire, 69300 Caluire FRANCE,  
or on customer site (see above conditions).



## Accreditation

SETARAM is accredited as a training organization under the number 82.69.09783.69.

## Registration

All registration requests are to be sent to: Mrs Mireille THIMON  
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## Trainings description

### **Thermogravimetry applied to Setsys TGA (TGA-DTA and TGA-DSC)**

Intended for users of SetsysTGA (TGA-DTA and TGA-DSC) equipped with cryo furnaces, 1200°C, 1600°C and 1750°C. (The case of the 2400°C furnace can only be briefly covered in this course). Users of TG92 (TGA-DTA and TGA-DSC) can also follow this course, as the Setsys line is a development of the 92 line.

Course content:

- Definitions of thermogravimetry (TGA), differential thermal analysis (DTA) and DSC (differential scanning calorimetry)
- Review of the different components of Setsys TG: balance, furnace, temperature regulation, DTA rods, DSC rods, atmosphere control, crucibles and other accessories
- Conducting an experiment using TGA alone
- Conducting an experiment using TGA-DTA
- Conducting an experiment using TGA-DSC
- Use of the software
- Preventive maintenance
- Corrective maintenance

### **Thermogravimetry applied to Labsys TGAevo (TGA-DTA and TGA-DSC)**

Intended for users of LabsysTGA (TGA-DTA to TGA-DSC)

Course content:

- Definitions of thermogravimetry (TGA), differential thermal analysis (DTA) and DSC (differential scanning calorimetry)
- Review of the different components of Labsys TGA: balance, furnace, temperature regulation, DTA rods, DSC rods, atmosphere control, crucibles
- Conducting an experiment using TGA alone
- Conducting an experiment using TG-ATD
- Conducting an experiment using DSC alone
- Use of the software
- Preventive maintenance
- Corrective maintenance

### **Thermomechanical analysis (TMA) applied to Setsys TMA**

Intended for users of SetsysTMA equipped with 1200°C, 1600°C and 1750°C cryo furnaces (The case of the 2400°C furnace furnace can only be briefly covered in this course). Users of TMA92 can also follow this course, as the Setsys line is a development of the 92 line.

Course content:

- Definitions of thermomechanical analysis (TMA)
- Review of the different components of Setsys TMA: sensor, furnace, temperature regulation, atmosphere control, transducers
- Practical determination of expansion coefficients
- Use of the software
- Preventive maintenance
- Corrective maintenance

### **DSC (Differential Scanning Calorimetry) applied to DSC131 evo**

Intended for users of DSC131

Course content:

- Definitions of DSC
- Review of the different components of the DSC131 and its accessories
- Practical performance of an experiment using a DSC
- Analysis of the results
- Use of the software
- Preventive maintenance
- Corrective maintenance

### **MicroDSC evo(DSC: Differential Scanning Calorimetry)**

Intended for users of  $\mu$ DSCIII and  $\mu$ DSCVII

Course content:

- Definitions: calorimetric modes, sensors, theory of the calorimetric measurement
- Review of the different components of the microDSCIII and the different cells and accessories
- Experimental aspects of the calorimetric measurement (calibration, baseline and compensation, heating rate and resolution / sensitivity)
- Practical performance of a temperature scanning experiment
- Practical performance of an experiment in isothermal conditions
- Analysis of the results
- Use of the software

### **Calorimetry applied to the C80**

Intended for the users of the C80 calorimeter

Course content:

- Definitions of calorimetry
- Review of the different components of the C80 and the difference cells and accessories
- Practical performance of a mixing experiment
- Practical performance of a temperature scanning experiment
- Analysis of the results
- Use of the software
- Preventive maintenance
- Corrective maintenance
- Use of the software

### **Calorimetry applied to the SENSYS<sub>Sevo</sub>**

Intended for the users of the SENSYS DSC, TGDSC, DSC111, and TGDSC111.

Course content:

- Definitions of thermogravimetry (TGA), differential scanning calorimetry (DSC)
- Review of the different components (balance, furnace, temperature regulation, atmosphere control, crucibles)
- Conducting an experiment using TGA DSC
- Conducting an experiment using DSC alone
- Use of the software
- Preventive maintenance
- Corrective maintenance