

Navas Instruments TGA - 2000 & TGA-3000 Series

Thermogravimetric Analyzers (19 Samples) for:
Coal, coke, graphite, cement, bauxite, iron ore, food, feed,
flour, rubbers, fertilizers, plastics etc ...

Determination of: Moisture, volatiles, ash, fix carbon, LOI

TGA - 2000A

For coal, coke, Biomass etc...

Multiple sample thermogravimetric analyzer with auto crucible-covers for volatiles and operational program in Windows.
All heated parts are made of a stainless steel alloy for high temperature, no fragile ceramic parts.

Dual carousel configuration (Patented)

The dual carousel configuration allows automatic placement and removal of crucible-covers inside the furnace.

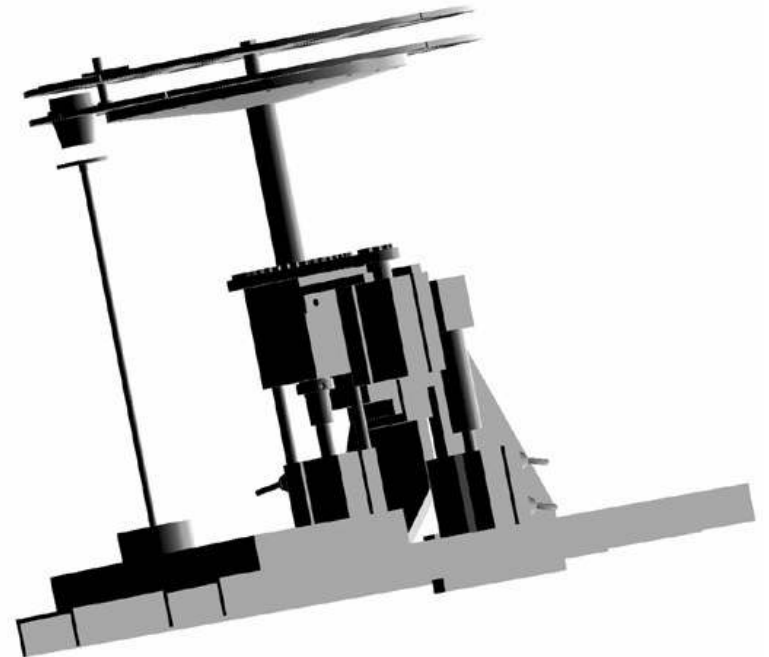
This prevents sample oxidizing and provides better volatile matter accuracy besides the automation, (It works unattended).

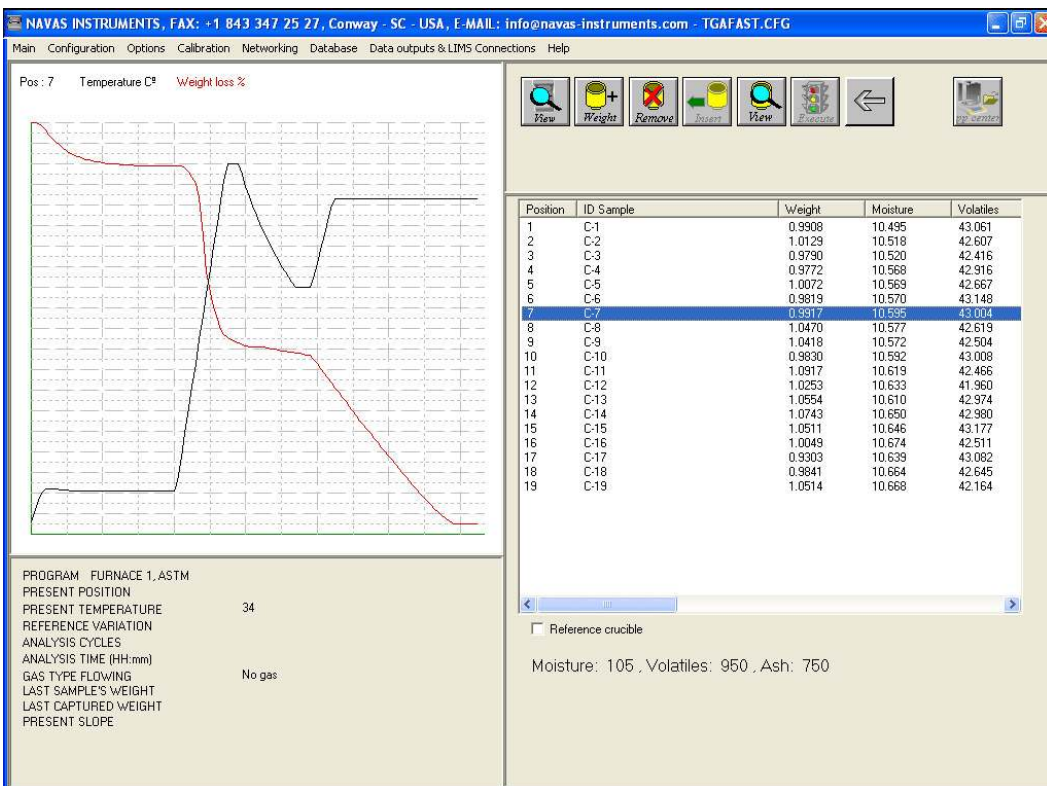
No danger to operator opening at 600°C.

No danger of falling covers inside furnace.

Auto-recovery from mains power failure

1 Full year warranty on all parts including carousels and crucibles





TGA Windows application

The windows software allows easy instrument operation.

Integration with **Microsoft Office**, results are stored in Microsoft Access Data base automatically, data can be exported automatically and manually in TXT, CSV and XLS formats to Microsoft Excel or several Laboratory Information Management Systems (**LIMS**).

The program also allows printing automatically and manually using customizable layouts.

Configurable parameters for all slopes up to 8 sets of settings:

Final temperatures, plateau deviations, gases, etc...

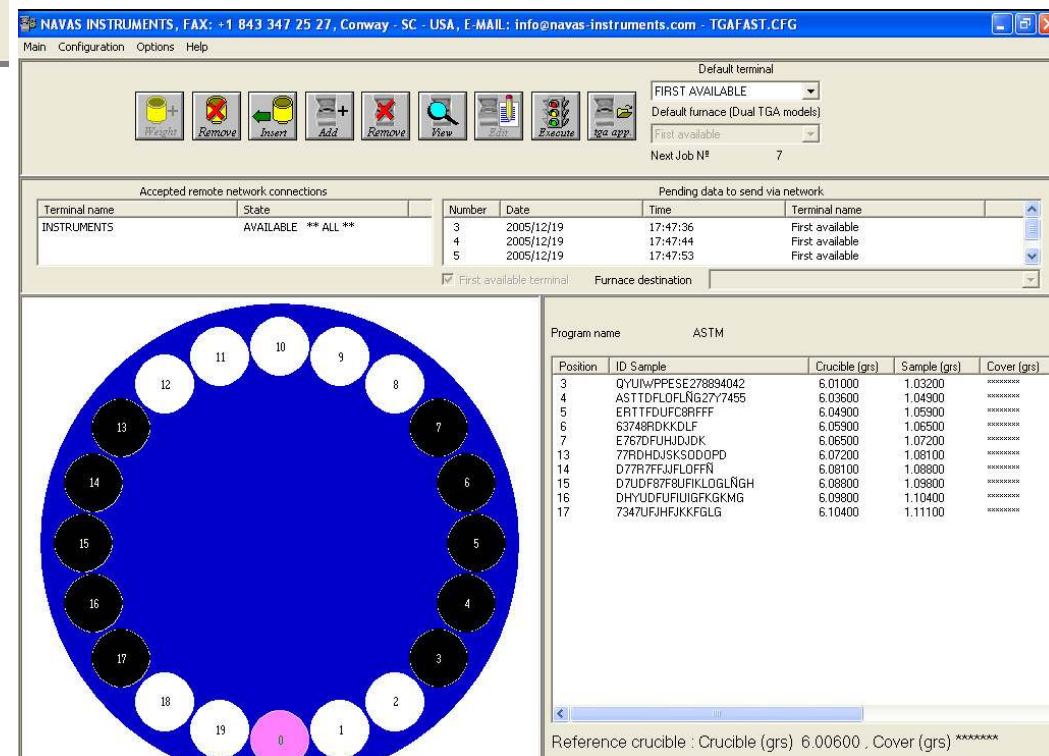
The software allows importing samples identification codes from LIMS in text files to speed up the samples weighing

Productivity & Performance Center (Patent Pending)

Models TGA-3000 Series use 1 single PC to manage the instrument and an external balance at the same time (**Networking is optional**)

This operation allows performing the analysis in a 78 % of the time needed to do the same analysis in TGA manufactured by others, in iron ore, coal and other materials the analysis time reduction may be similar depending on the type of sample

This software can be used also in single and dual TGA models with one single PC and without network connection (The server software can be installed in the same PC that has the TGA software installed)



Open data base connectivity

The software has a powerful **ODBC data base** which allows filtering the data and sorting the rows and columns and exporting to several spreadsheets like **Microsoft Excel directly**, or Corel Quattro Pro or Lotus 123 etc through ASCII text files.

The **ODBC data base** allows the user configuring the format in which will be saved the data.

All the analysis data are archived in a **Microsoft Access** file (.MDB extension) which can be opened also using Microsoft Access.

The data base does not use proprietary formats, all the data is stored in standard formats and is accessible also using other programs in the market

Easy to use diagnostics

The diagnostics window allows activating manually all the mechanical functions of the instrument and checking the operation of the magnetic sensors, the balance and the furnace temperature controller.

The weight present in the balances, the temperature and the sensors are shown on the screen in real time as they are changing.

i.e. If there is a problem with the stability of the balance the weight on the screen will be moving.

If there is not gas pressure it is shown in the window etc ...

The Diagnostics window displays the following information and controls:

- FURNACE: FURNACE 2.**
- CAROUSEL MOTOR:** Home position, Offset Home, Carousel Position (0), Remove motor current, Covers.
- FURNACE BALANCE:** Tare, Calibrate, Actual Weight: **10.7340 g**.
- TEMPERATURE CONTROLLER:** Send Temperature (5), Actual temperature: **548 °C**.
- Lid level position:** Up (selected), Down, Conf..., Test lid partial opening (1).
- Carousel level:** Up (selected), Down.
- Gas type:** Nitrogen, Oxygen, Other gas, No Gas (selected).
- SWITCHES:** Carusel home, Carusel elevation, Lid switch, Gas Pressure, Enter Sample.

Buttons: Print, Export..., Send to RS-232 Serial port, Calibrate / Linearize, View graphic, Delete, OK, Cancel.

Metal parts instead of ceramics

The carousels are made of a stainless steel alloy for high temperature.

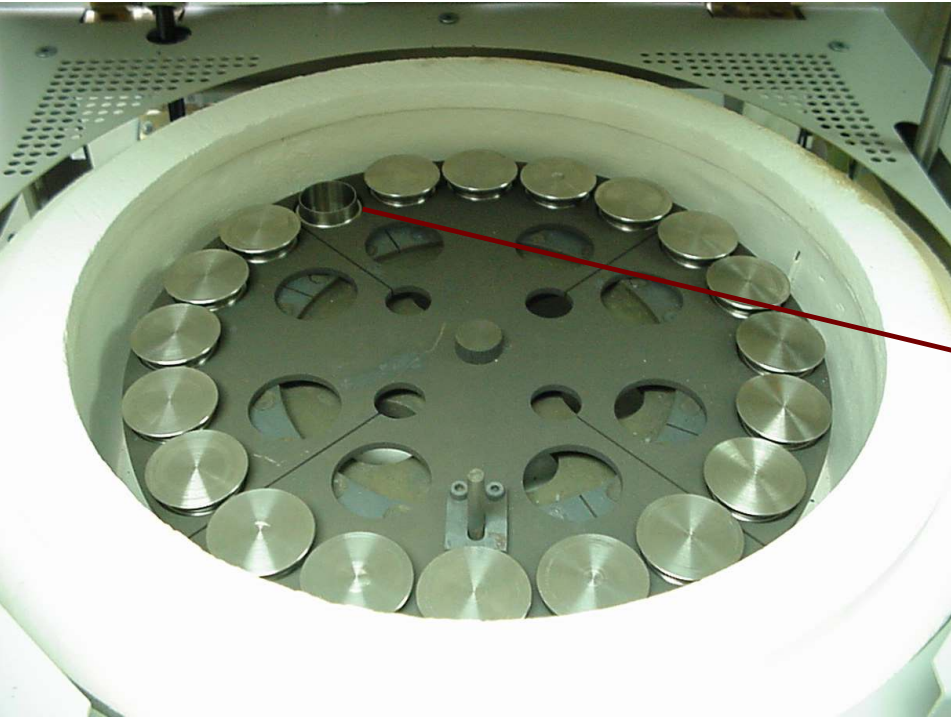
The carousels do not bend nor warp under temperature stress, metal does not break like ceramics.

Ceramics charges with static electricity and may produce unstable balance readings.

Our TGA carousel design have transversal cuttings to absorb expansion and contraction.

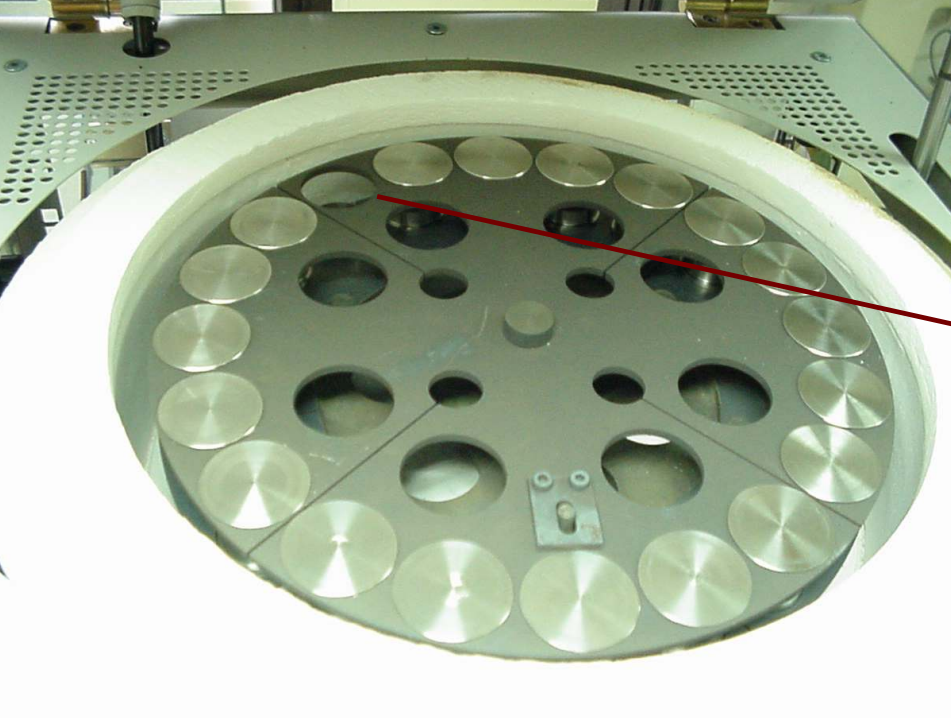
No deformation, unbreakable, durable

All heated parts metallic: carousels, crucibles, pedestal, covers.



Top
carousel
down
with
covers
placed

The image shows a top-down view of a circular stainless steel carousel inside a furnace. The carousel is in its lowered position, and its surface is covered with numerous small, circular metallic crucibles. A red arrow points from the text label to the carousel.



Top
carousel
up
with
covers
removed

The image shows a top-down view of the same stainless steel carousel, but it is in its raised position. The small metallic crucibles are no longer on the surface, and the circular cutouts in the carousel are clearly visible. A red arrow points from the text label to the carousel.

Standard components



Navas Instruments buys complete brand name balances and temperature controllers from recognized manufacturers.

The balance has display FOR EASY service. The temperature controller has 2 displays: 1 for the set point and other for the present temperature. The balance and the temperature controller are programmable using the buttons in the devices. These devices are manufactured by the experts in the business.

All the electric and pneumatic parts in the TGA can be acquired in the market: Magnetic switches, relays, pneumatic valves, pistons, fans etc...

With no dependency on Navas Instruments, However for our customers convenience we do maintain a complete parts and service department..

Other TGA manufacturers use special electronics and ceramic parts that can only be purchased from the manufacturer at very high price.

All the sensors are magnetic not affected by dust. Very few proprietary electronics (Only 2 boards), that are located in 2 PC slots.

ACCESS FOR SERVICE from back, sides, front and underneath.

TGA - SVR Series (Networking or single PC)

Navas Instruments has the pleasure to present the **TGA PRODUCTIVITY & PERFORMANCE CENTER SOFTWARE**.

This configuration allows a 22 % to 200 % increased productivity and throughput over other TGA manufacturers.

This software allows with 1 single PC to manage the instrument balance and an external balance to get the initial weights of crucibles, samples and/or covers outside of the furnace during analysis time.

Crucibles are placed in plastic trays to be placed later inside instrument with next batch.

The advantages are:

1- No analysis time spent in getting the initial weights of crucibles, samples and/or covers as initial weights are not obtained inside instrument but in external balance during analysis.

2- No need to cool down to room temperature (34°C), but to 60 - 70°C.

In TGA manufactured by others there is need to cool down to 34°C because initial weights are always obtained inside furnace, if furnace temperature is higher than 34°C initial weights gets distorted as samples loses weight.

In Navas TGA samples are pre-weighed outside instrument.

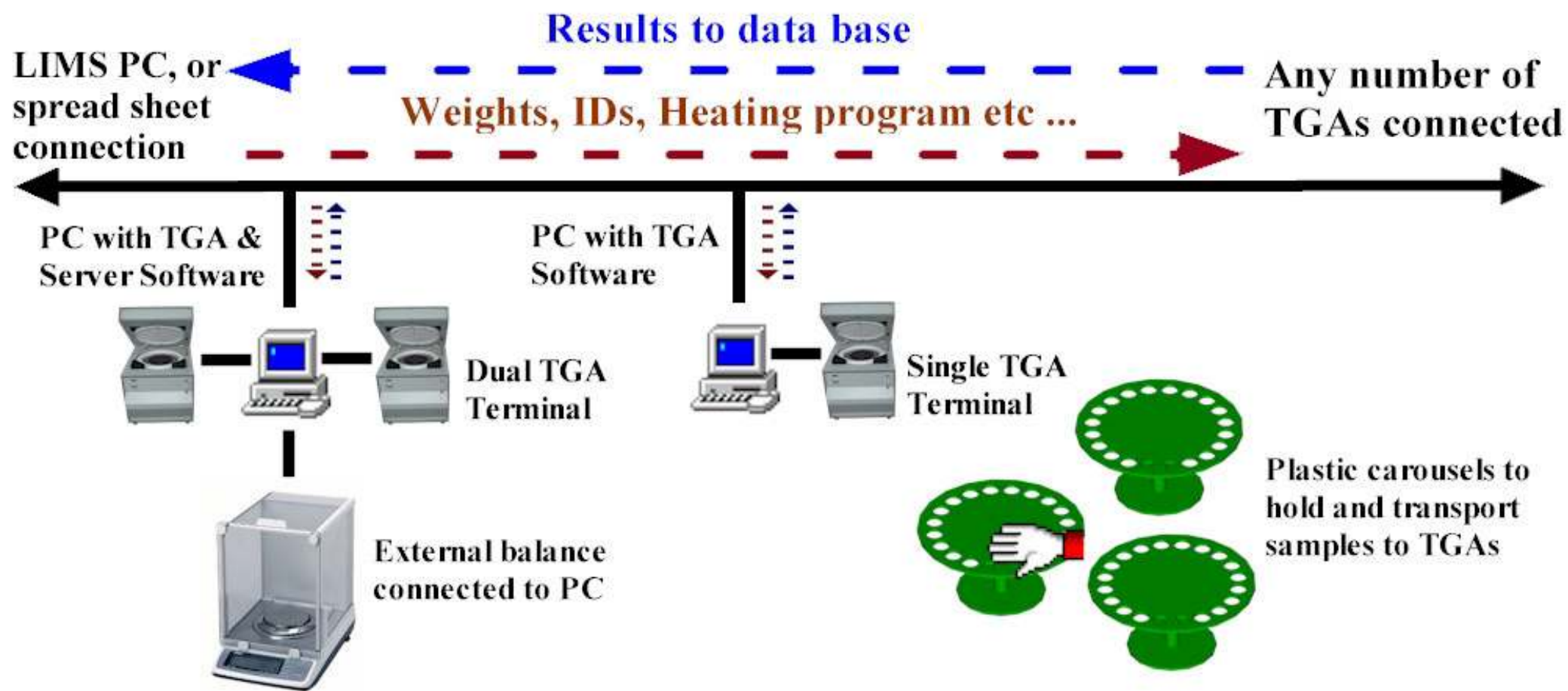
3- Operator weighs samples comfortably (do not have to stand up) in external balance.

4- No sample spilled inside furnace.

Navas Instruments also use complete balances with display inside and outside furnace, not the balance simulators that use other TGA manufacturers.

Navas Instruments buys the balances from recognized balance manufacturers and our TGAs communicates with these balances with the standard protocol RS-232 using a cable.

TGA-2000 Instruments can be purchased with single balance and later upgraded to have external balance



COMPARISON OF THROUGHPUT/ DAY WITH NAVAS & OTHER TGA MANUFACTURERS

Example of 5 batches (19 samples) to 1000 °C in Iron ore analysis, the same is partially applicable to analysis of other materials like: Coal, Cement, Bauxite, Food, Animal feed etc...

This example is approximate and times are shown in minutes.

CONVENTIONAL TGA			NAVAS INSTRUMENTS TGA		
Batch N° 1	Get initial weights of crucibles & samples inside furnace	20	Batch N° 1	Get initial weights of crucibles & samples inside furnace	20
	Analyse samples with balance simulator	90		Analyse samples with brand-name balance	90
	Cool down to room temperature (34°C) for next batch to be weighed inside furnace	50		Cool down to 60 - 70°C as pre-weighed samples will be placed in instrument from plastic tray	30
Batch N° 2	Get initial weights of crucibles & samples inside furnace	20	Batch N° 2	Move by hand pre-weighed crucibles with samples from plastic tray to instrument	1
	Analyse samples with balance simulator	90		Analyse samples with brand-name balance	90
	Cool down to room temperature (34°C) for next batch to be weighed inside furnace	50		Cool down to 60 - 70°C as pre-weighed samples will be placed in instrument from plastic tray	30
Batch N° 3	Get initial weights of crucibles & samples inside furnace	20	Batch N° 3	Move by hand pre-weighed crucibles with samples from plastic tray to instrument	1
	Analyse samples with balance simulator	90		Analyse samples with brand-name balance	90
	Cool down to room temperature (34°C) for next batch to be weighed inside furnace	50		Cool down to 60 - 70°C as pre-weighed samples will be placed in instrument from plastic tray	30
Batch N° 4	Get initial weights of crucibles & samples inside furnace	20	Batch N° 4	Move by hand pre-weighed crucibles with samples from plastic tray to instrument	1
	Analyse samples with balance simulator	90		Analyse samples with brand-name balance	90
	Cool down to room temperature (34°C) for next batch to be weighed inside furnace	50		Cool down to 60 - 70°C as pre-weighed samples will be placed in instrument from plastic tray	30
Batch N° 5	Get initial weights of crucibles & samples inside furnace	20	Batch N° 5	Move by hand pre-weighed crucibles with samples from plastic tray to instrument	1
	Analyse samples with balance simulator	90		Analyse samples with brand-name balance	90
	Cool down to room temperature (34°C) for next batch to be weighed inside furnace	50		Cool down to 60 - 70°C as pre-weighed samples will be placed in instrument from plastic tray	30
TOTAL TIME		13 Hours + 20 minutes	TOTAL TIME		10 Hours + 24 minutes

TGA-2000 Series Technical Specifications

- Sample size: 0.1 ~ 10 grams
- Number of samples: 1 to 19
- Weight Loss/Gain range: 0 ~ 100 %
- Instrument precision : Standard deviation of ± 0.0002 g
- Complete brand name precision balance with display ,Sensitivity : 0.0001 gram
- Furnace temperature range: 50 ~ 1000 ° C With dual metallic carousel for automatic cover placement and removal for volatiles analysis
- Furnace temperature stability:
 - $\pm 1^{\circ}\text{C}$ at 105°C.
 - $\pm 2^{\circ}\text{C}$ at other temperatures.
 - Controlled with brand name temperature controller.
- Ramp rate:

Start Temperature	End Temperature	Programmable rate
25°C	107°C	5 to 30°C / Min
104°C	1000°C	5 to 50°C / Min
550°C	750°C	5 to 40°C / Min

- Programs :
 - Up to 8 editable programs with 50 editable factors and 50 linear correction factors for each slope and for each program, non-linear regression and curves fitting for volatiles and all the slopes using interpolation, least squares, quadratic and cubic formulas.
- Processor and equipment:
 - Standard PC with Pentium® processor and 2 electronic boards plugged inside for system control.
 - Communications with digital balance and controller by RS-232 cables.
 - Color monitor.
 - Color printer.
 - Keyboard.
 - Mouse.
- Software:
 - Visual Software in Windows® .
 - With all possible features you will need.
- Data transisthmian Software:
 - Connection to other PC or network software included in ASCII text files (TXT, CSV and XLS formats) for Excel® or other programs like QuattroPro® or Lotus® 123.
 - Up to 10 TGA-2000A connected to a external balance and server for users with massive number of analysis.

SINGLE FURNACE OR DUAL FURNACE CONTROLLED BY ONE SINGLE PC

Complies with standard methodologies related to this type TGA analysis



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