

PETes AA Analyzer



▣ English

The measurement of the Acetaldehyde (AA) content in PET preforms has become one of the key acceptance tests with major bottling companies. AA content in preforms represents the index of polymer degradation occurred during the whole plastification process and it can affect beverage taste, especially non-carbonated water.



▶ Traditional AA measurement method

The most common measurement method is based on a gas chromatography analysis of the acetaldehyde present in head space and desorbed from the material placed into a sealed vials after a thermal treatment. This, however, is quite complex and does not allow a good repeatability to be easily reached ($RSD < 15\%$) and it can not guarantee reproducibility (comparable data between analysis carried out, on the same sample, by different laboratories). Too many variables affect this procedure, such as the sample preparation (e.g. different cryogenic treatment, different milling procedure, different parts of the sample under testing), the gas chromatographic method (different column and head space system, incubation time and sample temperature conditioning), technician, ...

Sample preparation

- Preparation of the calibration solution
- Gas chromatography head space analysis
- Data elaboration

▶ Revolutionary PETes AA Analyzer

With its revolutionary approach, the PETes AA Analyzer overcomes the inconvenience of traditional AA testing methods. This instrument is the only alternative available on the market nowadays, guaranteeing a repeatable method to constantly monitor the production process and contribute to time reduction for carrying out AA measurements. In addition AA measurements can be performed without any preparation of preforms.



Lab model

PETes AA Analyzer

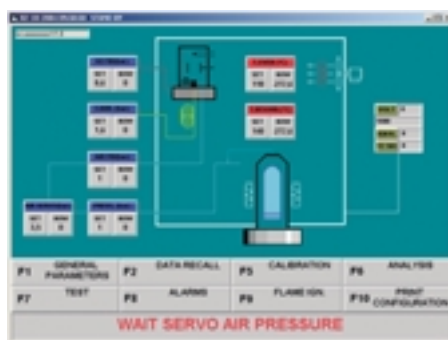


Functioning principle

The instrument is based on the Fast Head Space Gas-Chromatography technology. The PET preform is loaded into the de-adsorption cell, which is hermetically closed and heated for a pre-set time. When the heating is completed, an airflow enters the cell and transfers a defined quantity of the produced gases in the loop. The extracted gas sample is then conveyed by means of a gas carrier through the column where, using a FID detector, the AA content is measured. At the end of the measurement cycle, the AA Analyzer automatically sets itself in the stand-by mode and it is immediately ready for subsequent measurements.

The monitor displays the chromatogram with the AA peak as well as analytical and other preform data such as weight, colour and machine number. The preform data can be stored in a database and recalled whenever AA measures are to be carried out. The time required for a complete AA measurement amounts to 30 minutes.

The instrument allows a very good repeatability to be easily reached ($RSD < 10\%$) and reproducibility to be attained.



Operating phase

- Preform introduction into the cell

The other phases such as pressurisation and heating of the cell, loading of the loop and GC analysis are automatically carried out by the instrument itself.



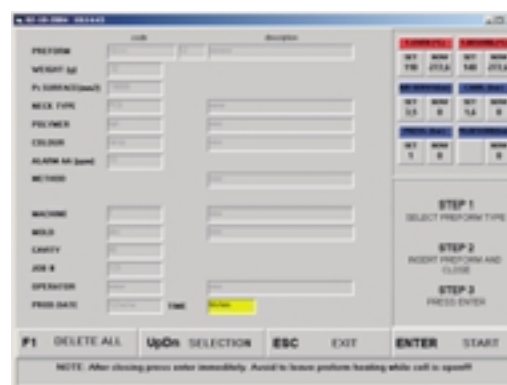


Characteristics:

- The de-adsorption cell is located inside the instrument cabinet in order to allow a quick and easy preform loading and inspection;
- Pressure is constantly measured and monitored inside the de-adsorption cell in order to control the influence of humidity on the sample dilution;
- The temperature inside the cell is controlled with high accuracy by a microprocessor-based instrument and is constantly displayed on the monitor;
- Automatic washing of the cell by internal overpressure, clears any memory effect;
- An automatic sampling valve guarantees high repeatability;
- Calibration frequency is considerably reduced and simplified.

Advantages:

- > Real time control of production quality parameters;
- > Real time control of production lots;
- > Completely automatic measurement method;
- > High repeatability of AA tests;
- > Extremely reliable AA data;
- > No need for sample preparation and sample milling;
- > No need for skilled lab technician for AA measurements;
- > Very low detection limit (0,5 ug absolute of AA that means a value below of 0,5 ppm in the sample tested);
- > Reduction of measurement costs;
- > Reduction of the time required for AA measurements;
- > Suitable for a wide range of preforms, using the same de-adsorption cell;
- > Possible positioning of the instrument beside the injection moulding machine;
- > Possibility to easily compare AA results with different existing test methods;



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Lab model

The Lab model has been designed for those factories where a Quality Control laboratory exists. The AA Analyzer cabinet requires the following external utilities and sources: power supply, air and hydrogen for gas chromatographic analysis.



Turret model

The Turret model has been designed for those factories where a Quality Control laboratory does not exist. The AA Analyzer turret is ideally suited for installation beside the injection moulding machine or anywhere in the production facility. The printer is also included as a standard feature. The instrument is housed in a free standing cabinet and comes complete with:

- > Preform de-adsorption cell;
- > Analysis chamber with dedicated acetaldehyde column;
- > Automatic flow valves system;
- > Double air filter system for the compressed air treatment with differential manometer;
- > Zero air generator;
- > Hydrogen safety device;
- > Dedicated compact cabinet;
- > Keyboard, monitor (TFT colour) and dedicated software for a complete automatic control of the instrument (temperature, alarms, pressure, chromatogram, etc...);
- > Ink-jet printer.

The hydrogen generator is not included.

Optional:

- > Calibration system





Calibration

Calibration can be carried out using a standard certificated solution of acetaldehyde. It is also possible to use a solution of ethanol in water (1% v/v) in order to simply verify the stability of the instrumental response.



Software

A dedicated software has been especially developed for ensuring simplicity of use also for non-skilled machine operators. The system can be easily connected to the company network and allows for easily accessible information from the process. The software is extremely user-friendly and designed with an on-line guide.

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Configurations

	Turret model	Lab model
Detector	FID	FID
Heating chamber	max. 160 mm long preform	max. 160 mm long preform
Heating temperature range	from 50 up to 150°C; adjustable	from 50 up to 150°C; adjustable
Working temperature	140°C	140°C
Repeatability	RSD < 10%	RSD < 10%
Method sensitivity limit	0,5 µg absolute of acetaldehyde	0,5 µg absolute of acetaldehyde
Heating time	30 minutes; adjustable	30 minutes; adjustable
Analysis time	3 minutes	3 minutes
Display	Colour 10.5" VGA TFT resolution	Colour 10.5" VGA TFT resolution
Printer	included; ink-jet	optional
Network connection	ethernet card	ethernet card
Electrical power	110/220 VCA, 50/60 Hz 500 VA	110/220 VCA, 50/60 Hz 500 VA
Hydrogen	for GC analysis (99.9995%)	for GC analysis (99.9995%)
Hydrogen consumption	50 cc/min	50 cc/min
Compressed air	5-8 bar (without lubricants)	for GC analysis (99.999%)
Compressed air consumption	circa 1000 cc/min	circa 1000 cc/min
Dimensions (LxWxH)	600 x 1080 x 1800 mm	505 x 555 x 370 mm
Weight	65 kg	20 kg

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