Provetto BMSA

Low background gamma spectroscopy for metal samples, powders and slags

Functioning

Provetto is simple to use because all the difficulty is absorbed by us: during installation the system is configured and calibrated. The measurement report can be customized.
The laboratory technician only needs to start the measurement and print the analysis report.

A calibration source is used for routine checks (every month or quarter, tipically) aimed at verifying correct operation.
In this way your measurement reports will be supported by a quality control procedure.
Provetto performs 'total gamma' check. The "spectro" function allows to make a spectroscopic differentiation, with separate analisys of three different components: ^{137}Cs, ^{60}Co and Total Gamma.
The measurement time is between 5 and 12 minutes, depending on the choosen detector, and desired sensitivity.

Sensitivity

The sensitivity of a gamma spectroscopic system is given by the MDA (Minimum detectable activity) in Bq/g.

This value is relative to a given radioisotope (e.g ^{60}Co) and depends on confidence level (sigma factor), measurement time (it is inversely proportional to the root of time), detector efficiency and measured background for that particular gamma emission (energy).
So, to define the sensitivity of a measurement system it is not possible to give just a number, but is necessary to specify the isotope, the measurement time, the confidence level, and the sample geometry.

The MDA formula (in Bq/g) with a 95% confidence level, normally internationally accepted by international authorities.

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$$MDA = 3.29 \frac{\sqrt{2B}}{\sqrt{T} * E * Y * W}$$

COMPONENTS

- Low background measurement lead shielding, inner size: diameter 250 - height 220. Pb thickness: 50 mm. Cu and Sn thickness: 1 mm each. It works also with Marinelli beaker till 2 lt volume;

- NaI(Tl) scintillation detector 2"x2" or 3"x3"(optional);

- Dedicated calibration source;

- Windows^{TM} PC with BMSA (Brumola Metal Sample Analysis) software, and b/w printer;

- Electronic MCA (Multi Channel Analyzer) that includes pre-amplifier, amplifier and USB cable for the PC connection.

* *Symbols meaning:*

B: Background in the shielding, based on the isotope energy, in cps;

T: Measurement time;

E: Efficiency (based on the detector type and isotope energy);

Y: Energy emission percentage of the choosen isotope;

W: Sample weight in grams;

BMSA Software

Features :

Measurement and analysis cycle management;

Display of spectra as a function of energy;

Analysis results recorded in CVS file readable by MS EXCEL or similar, measurement report recorded in PDF and connected spectra in standard IAEA format;

The system allows the gamma spectra acquisition and analysis and determines the concentration of ^{60}Co in metal samples, and of ^{137}Cs in powders and slags;

The system is delivered efficiency calibrated for the indicated isotopes respecting the "sample" geometry;

It performs also a total count check (in cps) with alarm indication if the threshold is exceeded;

The automatic measurement procedure is the following:

    - Pre-fixed time measurement (default 300 seconds) with spectrum display;

    - Sample parameters request (description, weight, etc.);

    - Analysis results displayed at the end of measurement, printable;

    - Automatic results and spetrum record on the hard-disk.