

**RADIOACTIVE CONTAMINATION ANALYSER
for Steel / Metal Samples Analysis**

TYPE: RA1006

Technical Data

FEATURES:



- System is useful in measuring RaC in steel / Metal samples.
- Highly recommended for medium / large scale recycle steel industry having smelting furnaces.
- System will identify the type of nuclide in the sample and also quantifies contamination in Bq/g.
- System uses 3" x 3" NaI scintillation detector for gamma spectra analysis.
- 1K/4K/8K Channel Resolution.
- MCA card uses USB Interface.
- Adequate lead shielding 50/60mm to cover the detector and sample has been provided.
- Systems generates RaC analysis reports and gives output in Bq/g.

Radioactive contamination Analyzer (RaC) RA1006 : RA1006 is a laboratory instrument. It measures Radioactive Contamination (RaC) in metal parts such as steel, brass, Aluminum, Copper and Castings. It is also highly recommended for steel, Metal Industry(Steel, Brass, Aluminum,Copper)& foundry/casting industry for their QA departments to measure RaC in their components / products. System measure RaC in Bq/g. Most of the portable hand held meters cannot measure contamination in Bq/g. Also hand held meters may fail to detect very low levels of contamination less than 0.1 Bq/g, unless carefully measured & interpreted. Whereas RaC measurement by this system is a fool proof method.

This is a most sensitive equipment designed to record Gamma Spectra of the sample under study. This consists of a 3" X 3" NaI scintillation detector with Pre-Amplifier, High Voltage, Linear Amplifier Multi-Channel Analyzer System. Detector is covered by 50/60 mm lead shielding to reduce background. This system can detect nuclide specific contamination in any steel/ alloy / casting sample & quantify it also, in Bq/Kg or Bq/gm etc.

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The system configuration consists of MINIM BIN with power supply (MB403), High Voltage (HV502), Linear Amplifier (LA520) and 8K MCA, 3"x3" scintillation detector with 50/60mm lead shielding, personal computer system, software for isotopic data acquisition & contamination report generation software.

This system gives isotopic details in addition to quantification of the Radioactive contamination present in steel samples. The System has lot of powerful data processing & analysis features which include spectrum acquisition, printing, plotting, ROI selection, vertical, horizontal scale expansion etc. Software is made very user friendly.

SPECIFICATIONS

MINIBIN AND POWER SUPPLY MB 403:

Accommodates SIX / EIGHT single bit modules or combination of multiple widths with Amphenol connectors. Minim bin is primarily designed with the objective of conserving bench space and to achieve significant saving in cost of the Minim bin based systems. Bussed wiring is provided to the power connectors to distribute +/- 12V and +/- 24V. A control panel with ON/OFF switch, low voltage test sockets are provided on the right extreme side of the bin.

Minim bin Dimensions:

11.75" width X 11.00 depth (up to connectors) X 8.75" height.

Power supply:

This is either two and half bit module or a compact box type enclosure fitted at the back of this bin, which generates highly regulated D.C voltages.

Input: (230V + 10%) AC, 50Hz.

D.C Output: +12V@1.5A, -12V@ 1.5A, +24V @ 0.75A, -24V@0.75A and maximum wattage 72 watt.

Regulation: Better than +/- 0.1%

Noise & Ripple: Less than 3 mV

Stability: ± 0.5% after a 24 hr. warm up at constant line, load & ambient temp.

HIGH VOLTAGE UNIT (HV 502):

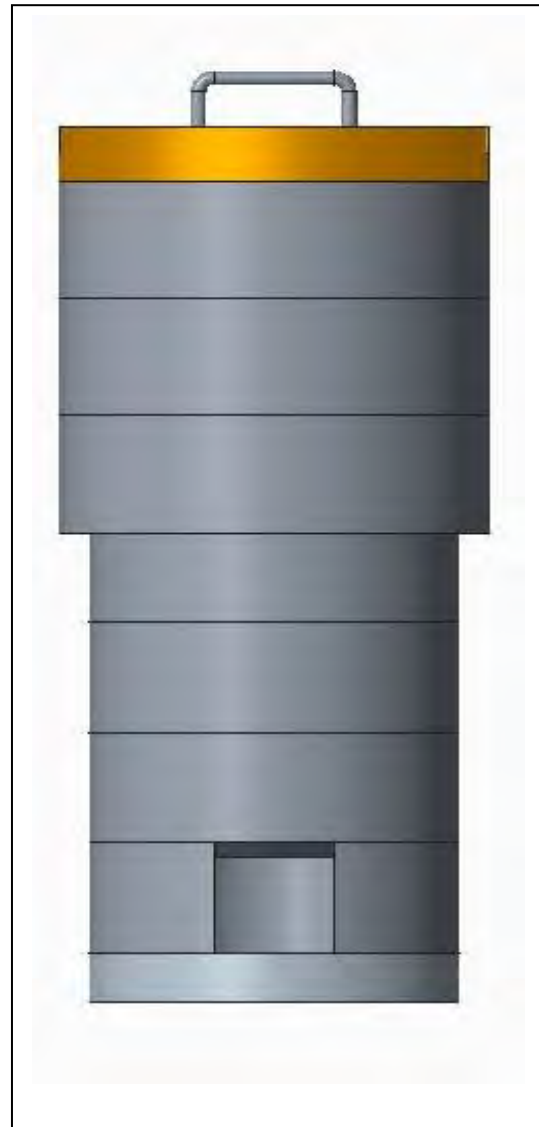
- Output voltage variable continuously from 0V to 2000 volts
- Output current (max) 1mA.
- Load & Line regulations: Better than 0.005% of full scale.
- Indefinite over load & short circuit protections and self-recovery.
- Output ripple less than 20mv.
- Dimensions: Single / Two-bit module.

LINEAR AMPLIFIER (LA 520):

- | | |
|---------------------------|------------------------|
| a. Input Polarity | : Positive or Negative |
| b. Total gain (Typical) | : 1000 (approx.) |
| c. Output (Unipolar) | : 0 to 8V |
| d. Max. output (Unipolar) | : 12V |
| e. Dimensions | : Two-bit module |

LEAD SHIELD:

This Lead Shield is designed to shield 3"x3" NaI detector Scintillation Detectors of NUCLEONIX make. It is built -up of interlocking rings with bottom and top plates. The bottom ring is provided with a small opening so that the cables from the Scintillation Detector Pre-amplifier base could be taken out for connecting to the Gamma Ray Spectrometer Counting System. The inside of the Lead Shield is lined with Aluminum to Minimise scattering. Thickness 50/60mm, accommodate 3" Scintillation Detector including sample of 3" overall size.



MULTI-CHANNEL ANALYZER (8K MCA):

Multi-Channel Analyzer (MCA) is an important part of nuclear spectroscopy system. The major requirement of MCA is for nuclear pulse height analysis in energy spectroscopy. The USB -MCA presented here, incorporates state of art technologies like FPGA, USB bus interface and precision analog electronics to meet the stringent system requirements in nuclear pulse spectroscopy. The resolution supported by the USB-MCA ranges from 256 channels to 8K channels selectable via software, making it suitable for all spectroscopy applications from low resolution (e.g. NaI -PMT) to high resolution (e.g. HP-Ge) systems.

The USB bus interface of the MCA provides an excellent connectivity with most of the new PCs and lap -top computers. The ANUSPECT application software provided with the USB-MCA, seamlessly integrates with the hardware, featuring a range of standard functions required for analysis and acquisition.

Hardware features:

- MCA resolution: 256, 512, 1K, 2K, 4K and 8K channels.
- Spectrum memory: 128K bytes single port SRAM.
- Max counts / channel: 31 bit (2 Giga counts).
- Pulse processing time: 7 μ s including ADC conversion time of 5 μ s.
- Pile up rejection: Active high TTL input from spectroscopy amplifier
- DNL: + 1% for 1K Resolution.
- INL: + 0.05% F.S for 1K Resolution.
- MCA Input: Single channel, 0 to +10 Volts.
- Power requirement: 5V, ~500 mA through USB cable directly (No external power supply required).

Software features:

Important software features include * spectrum display in two windows * marker selection (two) for ROI Detection & bracketing the peaks of interest, multiple ROI selection, deletion of ROIs etc.

File Handling: Involves storing, loading of complete Spectrum.

Print/Save: peak report, Activity report, ROI Report.

Acquisition: With pause option.

Erase: Erasing spectrum from memory

Spectrum Analysis: Find peak, Shape calibration, Energy calibration, Shape calibration, Efficiency Calibration, Activity Calculation, etc.,

Provided ROI Option: Insert and Deletion

Scale: X-axis can be chosen as Channel number (or) Energy axis (in Kev) & Y - axis has range from 256 to 64M in binary steps with auto scaling option. Y-scale can be linear or log LLD, ULD & base line is soft selectable in built Isotope library for isotope selection & matching.

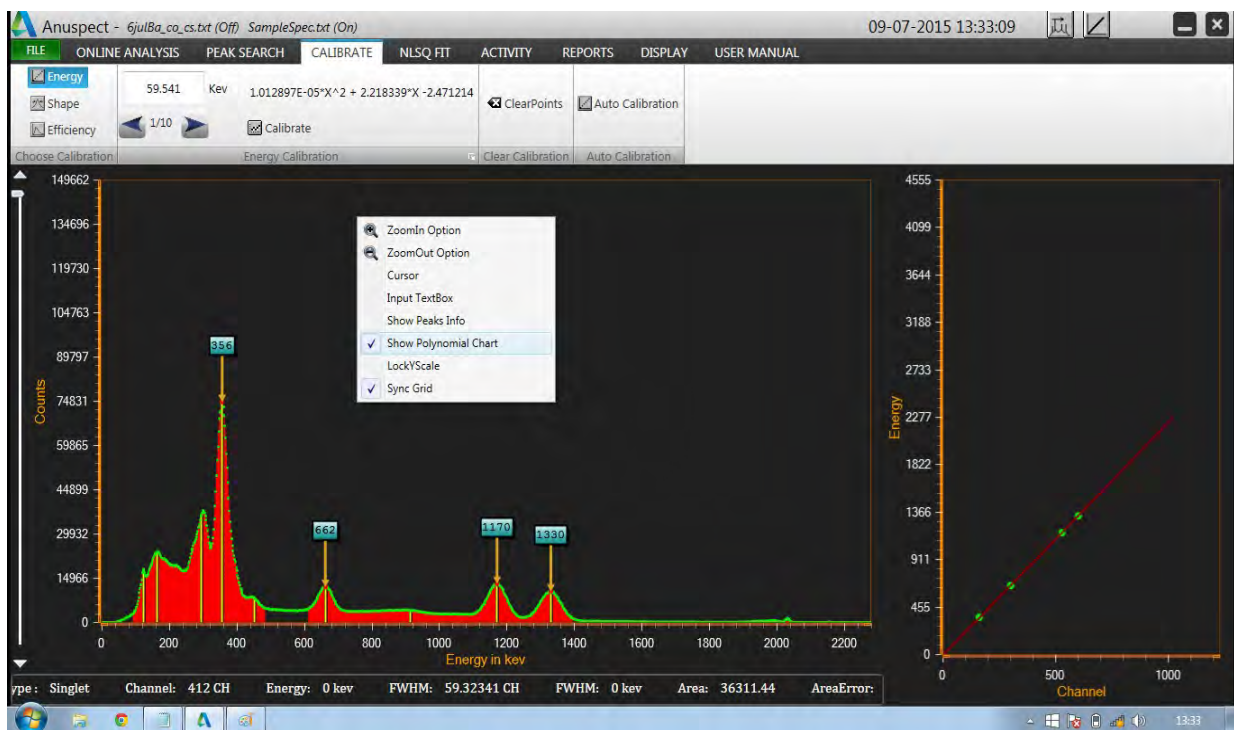


Fig. Energy Calibration



Fig. Efficiency Calibration

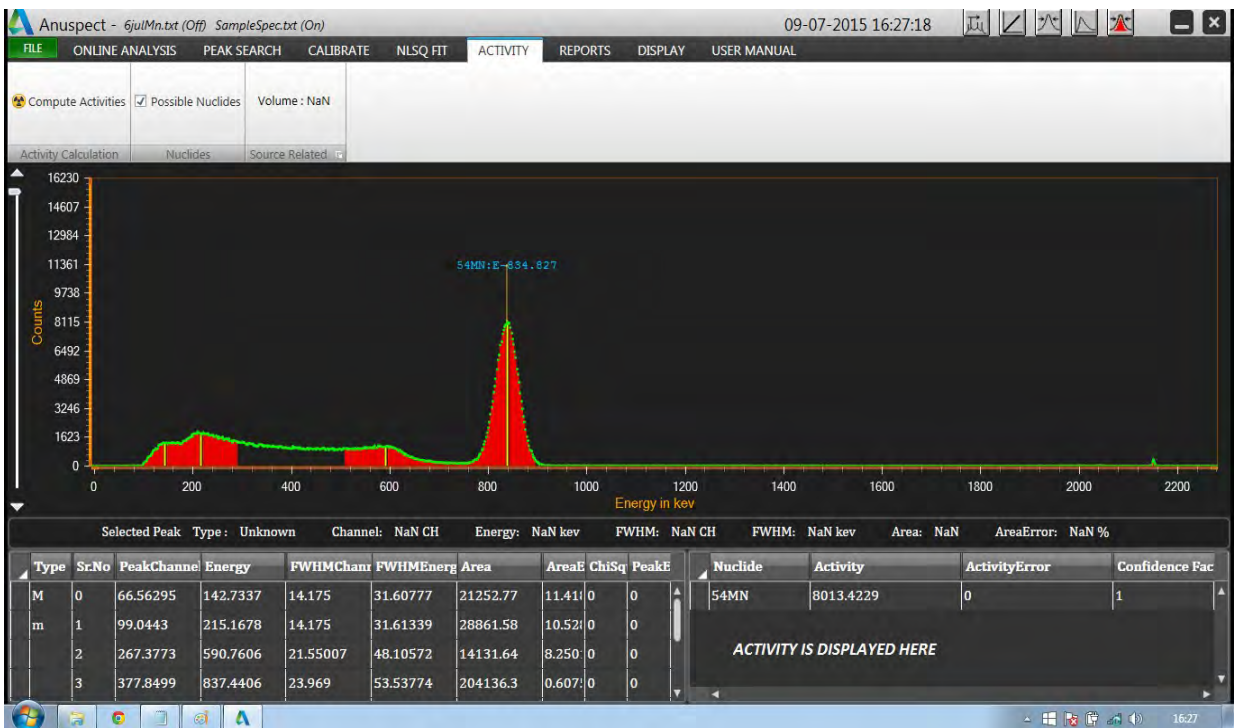


Fig. Isotope Identification and Activity Calculation

Nuclide	Confidence Factor	Activity	Activity Error
57CO	1	421.7495	0
137CS	1	8688.7861	0

Fig. Activity Report with isotope identification

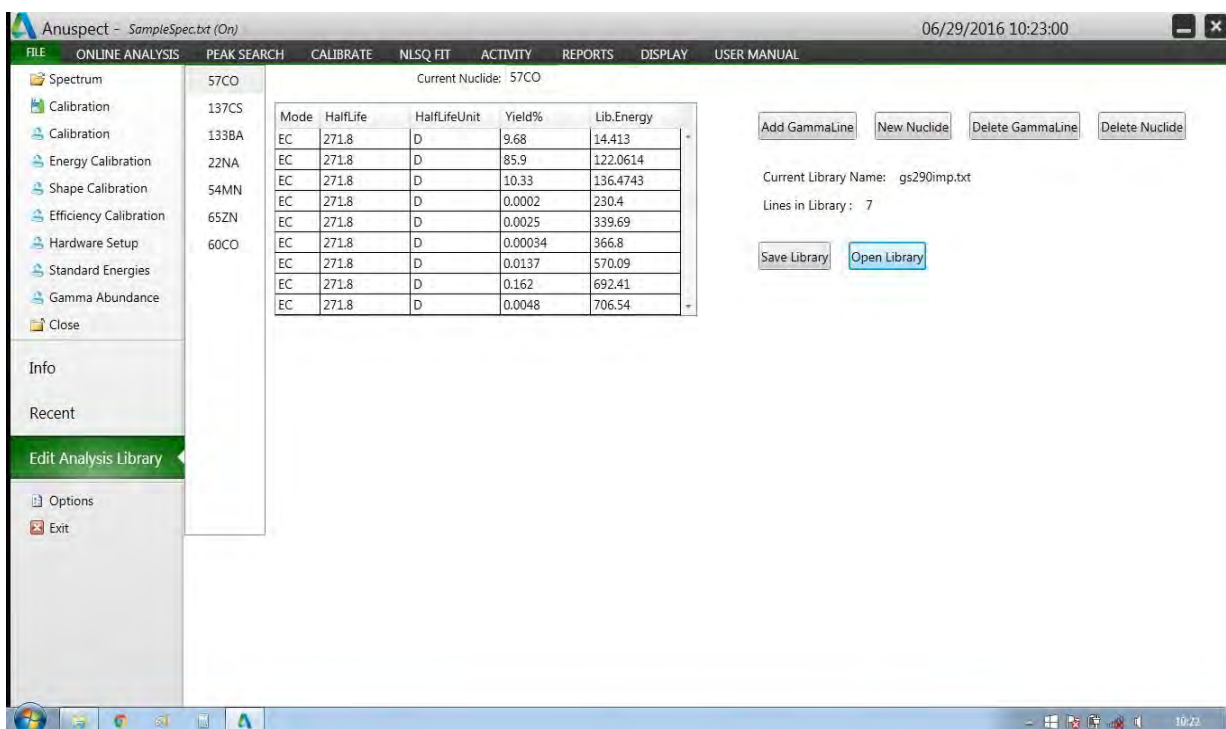


Fig. Part of Isotope Library

NOTE: There will be Continuous improvement and up gradation in the configuration particularly in software features. You will be provided with improved and latest version prevailing during the time of supply.