

Improvements Kayzero for Windows V4.04 15-1-2024

SAL: Select analytical lines-option; (x) see appendix below; new m\]]a`/9*/11enu options are marked

Date in	P	Topic	Problem	Solution	Version
2023-08-10	1	Bug	Manual input LD was not stored if the proposed number was not changed	Fixed	V4.04 (1)
2023-08-20	1	Input	Several small improvements in input	Improved	V4.04
2023-10-01	1	Calculation	Detection limit evaluation.	See evaluation in upcoming presentation on MTAA16	
2023-01-01	3	Back up	Make an order backup with all settings	New 'Archive' menu option, with read me option for explanation, old options are new under 'DataBase' menu option	V4.04 (2)
2023-05-18	2	Output	Report final result Units	Extra option: use one unit	V4.03
2023-07-05	1	Data	Additional Nuclides for Gepi	Can be done on request	V4.03
2023-07-05	1	Data	Extra gamma lines for explanation of peaks in the peak table list Add Menno's library	<u>Report/Results/Per gamma one measurement</u>	V4.03
2023-07-05	1	Data	Extra nuclides for explanation of possible gamma interferences Add Menno's library	<u>Report/Results/Per gamma one measurement</u>	V4.03
2023-07-05	1	Output	Round uncertainties with 2 digits in excel output or other outputs	done	V4.03
2023-07-05	1	Output	4 digits in Excel output	done	V4.03
2023-07-05	1	Output	Explain X, S, D added to nuclides in outputs	done	V4.03
2023-07-05	1	Output	unit LD is wrong in Order.RES	fixed	V4.03
2023-07-06	1	Data	Calculate Gepi	<u>Option/Tools/Neutron</u>	V4.03
2023-07-06	1	Calculation	Calculate only new measurements	<u>Samples/Calculate</u>	V4.03
2023-06-14	1	Input	XML-input Implementation, Header file per spectrum	<u>File/Read XML files</u>	V4.02 (3)
2023-05-26	1	SAL	Interference window	Drag to change size	V4.01
2023-01-01	1	Efficiency	Create efficiency input based on spectra and certificate files	<u>Solcoi/efficiency calibration</u>	V4.00 (4)
2023-01-01	1	Efficiency	Read Hyperlab efficiency file: higher order efficiency curve	<u>Solcoi/Use Hyperlab Efficiency</u>	V4.00 (5)
2023-05-01	1	Library	Implementation Extended Høgdahl for non-1/v (last paper)	For Lu, Yb and Eu	V4.00
2023-05-18	1	Library	F _{Cd} Need to be added to Kayzero library	Update k0-2020.FCD in library directory	V4.00
2023-05-18	1	Library	Sort elements alphabetically option	<u>Tools/Options/Special Parameter</u>	V4.00
2023-05-18	1	SAL	Ir-192 shown in SAL found but not present based on nuclides with lower detection limit that were not identified	Element identification updated	V4.00
2023-05-18	1	SAL	U-fission correction Interference factor	Updated data based on new <u>Kayzero/Fis-file</u>	V4.00
2023-05-18	1	SAL	10 measurements	8 is possible	V4.00
2023-05-22	1	Bug	Sb-124m has no COI because Sb-124M1 in COI-file	corrected	V4.00
2023-05-22	1	Input	Zero deadtime but Hyperlab gives a dead time when using ZDT-system	add a line 'ZDT' in <u>DETFWHM.DAT</u>	V4.00 (6)
2023-05-22	1	Library	Sb-122 k0's for code IVa	Change numbers	V4.00
2023-05-25	1	Bug	Mass matrix in Gepi calculation in 'Known Matrix' could not be changed	fixed	V4.00

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Appendix 1: Manual LD

Bug in "Samples/Select-Reject Analytical lines", fixed.

In case you rejected all gamma lines, an input field opens at 'LD element'. Using this input field, you can manually change the detection limit. If you don't change the value that is proposed, the detection limit is not stored properly, and this will lead to an undefined result in the report for this element.

mg/kg	Energy	FAST:1	FAST:2	LONG:1	LONG:2
Os Os-191	129.4	(1) <1.277E+5	<2.973E+4	<4.394E+0	4.679E-1
-> without interfer. correct.					
Epi Thermal Self Absorption Correction					
Gepi :	Os/Os-191	-	-	-	1.000E+0
Nuclide Average					
Concentration :	-	-	-	-	-
Expected StrDev % :	-	-	-	-	-
Observed StrDev % :	-	-	-	-	-
Extended Uncer. % :	-	-	-	-	-
LD :	1.0901E-1	1.277E+5	2.973E+4	4.394E+0	1.1112E-1
LD element :	1.0901E-1				
Other Nuclide LDs					
Os Os-193	LD :	5.6578E+4	1.4752E+4	8.0080E+1	3.8524E+1
Os Os-185	LD :	7.3468E+5	2.1394E+5	6.9245E+1	1.9463E+0

Appendix 2: Archive Options

These options allow you to back up orders.

Select archive location:

This menu option allows you to select or create a folder to which all archived data will be copied.

Archive orders:

All data is copied to an archive folder. The data is copied to a subfolder named: 'order'+ yyyy-mm-dd (copy date). If the currently used program is copied to the archive directory, it is also copied to the subdirectory. This program can be run from the same directory.

Reopen archive order:

Open an archived order to reproduce the previous results.

Close reopened order:

Close and return to the current system. The program can also be closed to return to the current system.

All data remains intact, the copy is created for backup purposes or can be sent to a partner for evaluation or error checking by k0-ware.

Appendix 3: XML Input

XML-header files can be read using option 'File/Read XML'.

Examples XML-header files can be made using option 'Archive/Make XML File'

Please make XML-file examples of header information a spectrum, these files contain all information needed by Kayzero to fill a measurement record.

Files per spectrum with this information can be read by the program from a special input directory. After reading and checking the input, they will be copied to the measurement directory where the spectrum is located. An output is created to show any problems.

Please have a look, if you encounter problems, please send me an email.

Appendix 4: full efficiency calibration

Short description of the files needed to do a full efficiency calibration

Select a folder that contains all peak table and spectrum files measured for the efficiency calibration. The measurements should be made on only one detector.

This procedure reads certificate files (or XXXXX.Cert) from the sources used and looks for PTF files (with SPE files) of measurements at positions (coded YYYYY) named XXXXXYYYYY. A measurement of the background (named: Background.PTF) is also needed for the PTT ratio calculation.

Based on this data, the program calculates efficiencies and PTT ratios and stores them in a file per position named: YYYY.Cal and PTTY.YY.Cal. All results are stored in a text file with the name of the directory. This file can be easily be read into Excel.

The PTT ratios are calculated for all peaks, so the user must make a selection manually. The Excel file can be used to update/correct the PTT ratios.

The certificate file (.Cert) is a TXT file and should look like the following:

Translated with DeepL.com (free version)
Isotope: Cd-109
Half-life: 461.9 day (day)
Activity: 41400 (Bq)
Emax: 95 (keV)
Uncertainty: 2.0 (% k=2)
Reference date: 20/10/2014 (dd/mm/yyyy hh:mm)
Comment: CMI, Czech
Gamma lines: (keV %)
88.034 3.66

Appendix 5: Read Hyperlab Efficiency analysis report

The 'Efficiency analysis report' produced by Hyperlab can be read by Kayzero to create a REF'detector'.DAT file with the reference efficiency curve fit parameters. All measurement points are read as well as the fitted curve. An 'detector'.cal file is created that can be used to validate the fitted curve.

Appendix 6: Zero dead time system (ZDT)

By adding a line with the text 'ZDT' (without REM) in the FWHM file, Kayzero knows that the deadtime for this detector is 0. Hyperlab uses the spectrum correctly but does not write the correct deadtime in PTF- or SPE-file.

FWHM'detector'.DAT file format:

```
4.4634 0.004817 0 0
  a      b      c      d
```

FWHM in keV = SQRT(a+b*e)

E in keV

FWHM for background calculation

ZDT

REM ZDT for zero deadtime system

REM LFC DUAL SPE' for Loss free counting system with dual spectrum zero deadtime

REM The following FWHM functions can be used:

REM FWHM in keV = a + b.e+ c.e^2 + d.e^3

REM FWHM in keV = a + b*SQRT(e)

REM FWHM in keV = SQRT(a+b*e)

REM

REM The type of function can be chosen by putting a line giving the function

REM after the line with "a b c d"

REM

REM Lines marked with REM are not seen by the program

Improvements to do:

2023-05-01	1	Code	Implementation for k fast for interference correction and analytical use	Kfast calculated from .par and .trs files	X
2023-05-18	1	Output	Excel output: rounding a la Jacko	?????	X
2023-07-05 2023-07-05	1	Output	check consistency with saved Excel file of analysis with "Select/Reject Analytical Lines" in case when result is above LD, but in Excel file is stored only LD.	Please show	X
2023-05-01	2	Output	Create readable output	CSV-output	X
2023-05-18	2	SAL	Save selection, bug?		X
2023-05-22	2	SAL	Sc-47 interference 159.4 /Ca-47 Fe-59 close to Ca-47 1297.1		X
2023-05-22	2	SAL	Se 264.7 keV concentration higher than limit of detection but not shown Ta, Hg?		X
2023-07-05	2	SAL	Look at complex gamma interferences like Hg and Se		X
2023-07-05	2	SAL	Gamma interferences: use concentrations before they are corrected for fission, Gapi, blank and threshold reaction		X
2023-05-25	3	Data	Density input: add list of pure elements	List given by Jacko	Z
2023-01-01	3	Efficiency	Implement efficiency uncertainties from Hyperlab	Use co-variance matrix Hyperlab	Z