

Uncertainty in Electrolytic Enrichment

(provided by R.L. Michel, USGS, Menlo Park)

Last modified: July 2010

Parameter	Definition	Comment	Sample 1	Sample 2
COUNTS	Count	Entered value	400	1975
TIME	Counting time	Constant	200	200
CPM	Count/minute	Count rate (COUNTS/TIME)	2.00	9.88
SIGCPM	Uncertainty in Background rate	$\sqrt{(\text{Count})/\text{Time}}$	0.10	0.22
BCK	Background	Instrument counter for dead water	2.00	2.00
SIGBCK	Background uncertainty	Constant	0.10	0.10
DECAY	Correction for loss of tritium since sample collection	Constant	0.99	0.99
NET	Net count rate corrected for decay	$(\text{CPM}-\text{BCK})/\text{DECAY}$	0.00	7.95
SIGNET	Uncertainty in net count rate	$\sqrt{(\text{SIGCPM}^2+\text{SIGBCK}^2)}/\text{DECAY}$	0.14	0.25
WT	Sample weight	Weight after electrolytic enrichment put into machine	9.00	9.00
WTCL	Correction of actual weight of sample	Correction of actual weight of sample to nominal weight used for calculations	9.00	9.00
CORCPM	Net count rate corrected for weight differential	Correction of count rate ($\text{NET} \times (\text{WTCL}/\text{WT})$)	0.00	7.95
SIGCOR	Uncertainty for count rate (correction factor)	Corrected count rate ($\text{SIGNET} \times \text{WT}$)	1.29	2.22
TU/cpm	Tritium units required to produce one count for counter efficiency at 9 grams	Instrument efficiency (constant)	70.00	70.00
SIG	Uncertainty	Constant	0.70	0.70
TU	Tritium concentration of sample as determined by calculation	$\text{CORCPM} \times (\text{TU}/\text{cpm})$	0.00	556.82
SIGTU	Uncertainty	$\sqrt{(((\text{TU}/\text{cpm})^2 \times \text{SIGCOR}^2) + (\text{CORCPM}^2 \times \text{SIG}^2))}$	90.00	155.16