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Title: An Empirical Method for Determining ^{234}U Percentage

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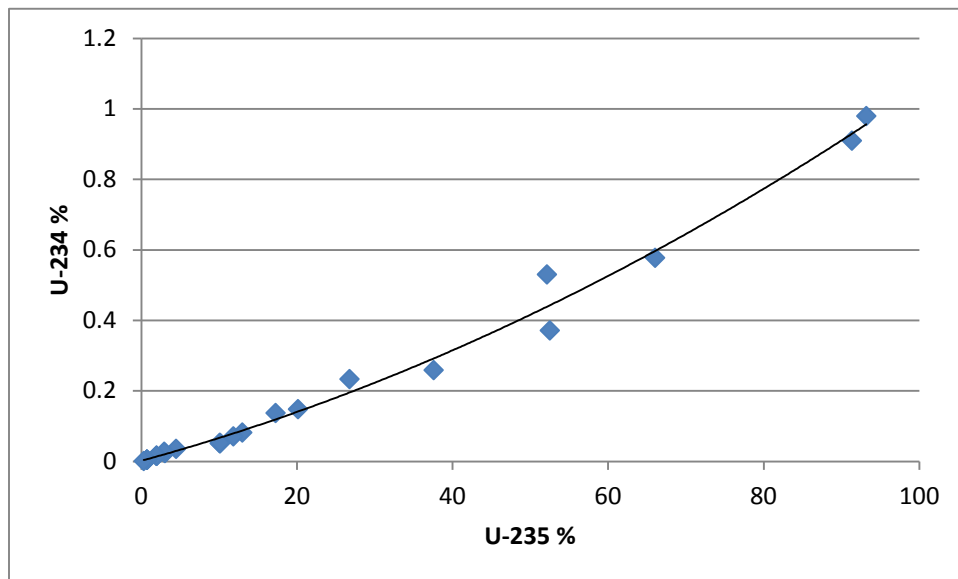
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An Empirical Method for Determining ^{234}U Percentage

When isotopic information for uranium is provided, the concentration of ^{234}U is frequently neglected. Often the isotopic content is given as a percentage of ^{235}U with the assumption that the remainder consists of ^{238}U . In certain applications, such as heat output, the concentration of ^{234}U can be a significant contributing factor. For situations where only the ^{235}U and ^{238}U values are given, a simple way to calculate the ^{234}U component would be beneficial.

The approach taken here is empirical. A series of uranium standards with varying enrichments were analyzed. The ^{234}U and ^{235}U data were fit using a second order polynomial. The formula, graph, and raw data are given below, uranium values are in weight percent:

$$^{234}\text{U} = 5\text{E-}05 \times ^{235}\text{U}^2 + 0.006 \times ^{235}\text{U} + 0.002$$



The correlation coefficient (R^2 value) for this fit is over 0.99, indicating that this is an accurate formula for the data. It is important to note that this is for uranium standards that have only undergone simple enrichment/depletion processes, it is not for spent fuel.

			U (wt %)		
Filename		234	235	236	238
NBL-9318		0.98	93.1703	0.2937	5.5559
UIISO-91		0.91026	91.3356	0.33512	7.41902
UIISO-66		0.57809	66.04046	0.25902	33.12243
NBL-5256		0.3718	52.488	0.26451	46.876
UIISO-52		0.53057	52.11744	0.86757	46.48442
UIISO-38		0.25983	37.55181	0.21722	61.97115
UIISO-27		0.23382	26.75187	0.26965	72.74465
NBL-2006		0.14861	20.107	0.1973	79.547
UIISO-17		0.13795	17.23855	0.16795	82.45555
UIISO-13		0.08272	12.95428	0.10131	86.86168
UIISO-12		0.07188	11.79735	0.1152	88.01557
A1-324-1		0.05119	10.0863	0.09035	89.77216
A1-324-2		0.05218	10.08432	0.09035	89.77315
A1-323-1		0.05316	10.10412	0.09134	89.75137
NBS-446		0.03591	4.46232	0.00685	95.49492
A1-1126-1		0.02459	3.0255	0.01587	96.93404
A1-1126-2		0.02459	3.02747	0.01686	96.93107
NBS-295		0.02793	2.94911	0.00327	97.01968
A1-1125-1		0.01573	1.93672	0.00893	98.03862
A1-1125-2		0.01573	1.9377	0.00893	98.03763
NBS-194		0.01711	1.94205	0.0003	98.04054
A1-1127-1		0.00492	0.7167	0.00198	99.2764
A1-1127-2		0.00492	0.7165	0.00198	99.2766
A1-408-2		0.00492	0.71354	0.00099	99.28055
A1-409		0.00492	0.70998	0.00099	99.28411
NBS-071		0.00521	0.71186	0	99.28293
NBS-031		0.00197	0.31656	0.01458	99.66689