Evaluation of intrinsic uncertainty in the k_0- NAA

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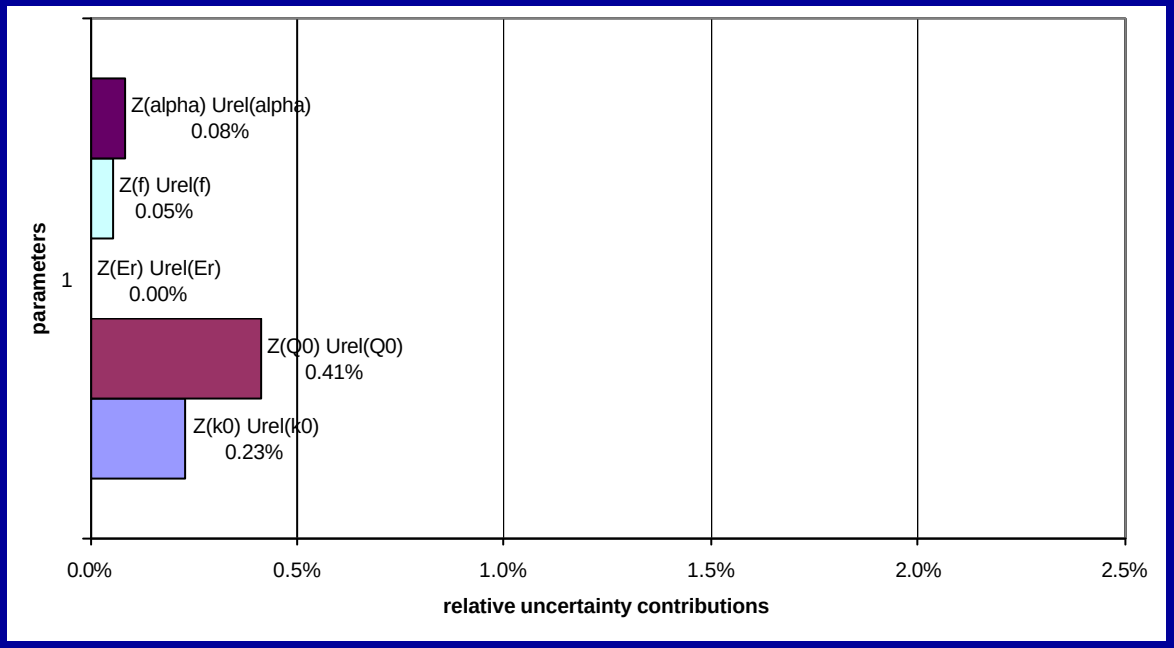
k_0- based neutron activation analysis (k_0- NAA)

$$w_a = \frac{\left(\frac{N_p / t_m}{S D C}\right)_a}{A_{sp,Au}} \frac{1}{k_{0,Au}(a)} \frac{G_{th,Au} f + G_{e,Au} Q_{0,Au}(a)}{G_{th,a} f + G_{e,a} Q_{0,a}(a)} \frac{\varepsilon_{p,Au}}{\varepsilon_{p,a}}$$

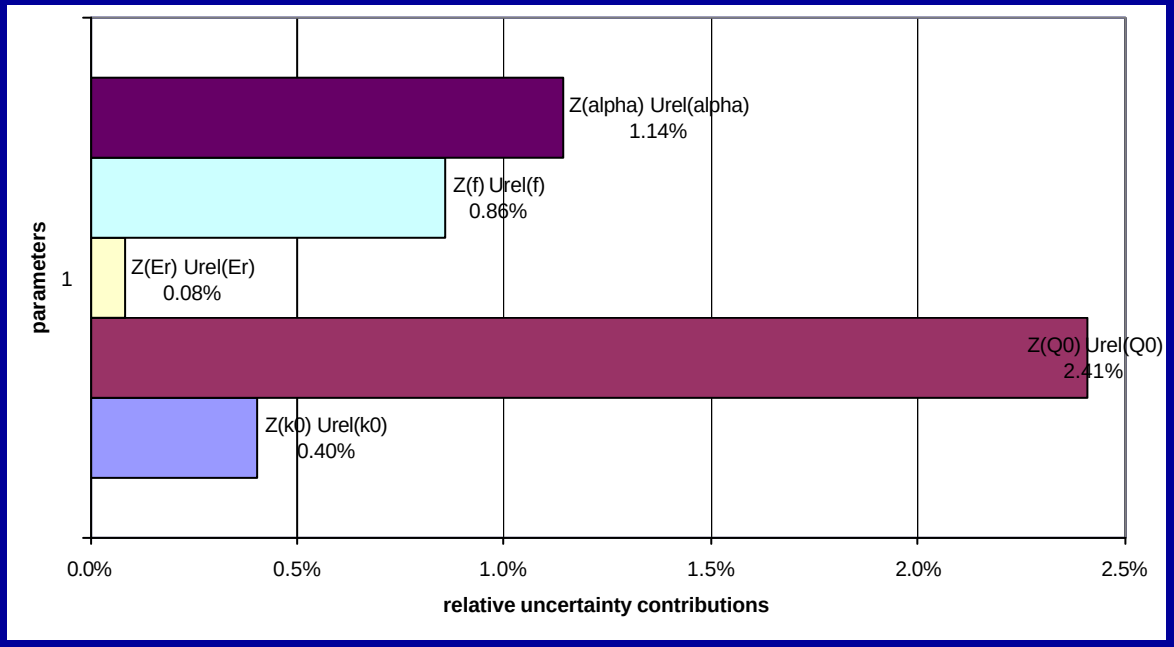
$$Q_0(a) = \frac{Q_0 - 0.429}{\left(\bar{E}_r\right)^a} + \frac{0.429}{(2a+1)(0.55)^a}$$

Partial uncertainty

- Unavoidable uncertainty u_p:
  - "intrinsic", u_{int} due to nuclear constants used: k_0, Q_0, ($T_{1/2}$), E_r
  - Neutron fluence-related, u_{flux} due to specific irradiation conditions: f, a
- u_{int}: V. P. Kolotov, F. De Corte, *Pure Appl. Chem.*, 2004, 76, 1921
- u_{flux}: Measurement
- Calculations: partial derivatives, ISO


Z(alpha) Urel(alpha)
0.08%
Z(f) Urel(f)
0.05%
Z(Er) Urel(Er)
0.00%
Z(Q0) Urel(Q0)
0.41%
Z(k0) Urel(k0)
0.23%
parameters
1
0.0%
0.5%
1.0%
1.5%
2.0%
2.5%
relative uncertainty contributions

^{153}Sm


Z(alpha) Urel(alpha)
1.14%
Z(f) Urel(f)
0.86%
Z(Er) Urel(Er)
0.08%
Z(Q0) Urel(Q0)
2.41%
Z(k0) Urel(k0)
0.40%
parameters
1
0.0%
0.5%
1.0%
1.5%
2.0%
2.5%
relative uncertainty contributions

^{99}Mo

Conclusions

- 71 nuclides evaluated both in terms of their u_i and Z_i
- u_p varied from 0,48 % to 2,83 %

	^{153}Sm	^{99}Mo
u_{int}	0,47	2,45
u_{flux}	0,10	1,43
u_p	0,48	2,83