Tasks from the 1st RCM: 3 - 5 October 2005

MATERIALS ANALYSIS TEST REPORT

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What to check:

precision
accuracy

precision: compare average relative uncertainty with the standard deviation of the replicates

accuracy: compare the averaged concentration with the "recommended" values, taking into account the average analytical uncertainty.

Look for possible causes of discrepancies.

Reactor	TRIGA Mark II	RA-6
Thermal power	250 kW	500 kW
	SMELS Type I	
Irradiation site	PT	I6 (graphite reflector)
Irradiation time	60 seg	6 min
f	27.99	100 (Mn, Au)
alfa	-0.0147	0.027
Thermal flux	3.38×10^{12}	1.13×10^{12}
	SMELS Type II	
Irradiation site	IC-40	F5 + pneumatic system
Irradiation time	2 h	1 h
f	28.81	27 (Sc, Au, Zr)
alfa	-0.0054	-0.023
Thermal flux	1.09×10^{12}	5.33×10^{12}
	SMELS Type III	
Irradiation site	IC-40	F5 / irradiation box
Irradiation time	1 h	20 h (Co, Au, Zr)
f	28.81	30
alfa	-0.0054	-0.019
Thermal flux	1.09×10^{12}	7.14×10^{12}
Counting system	OR4(40%)	HPGe type-n (10%) + DESPec-Plus, D=26cm
Analysis	k0_iaea program	k0 data (Trieste 2005)

lab	JSI			CAB		
Element	Average analytical uncertainty (%)	Standard deviation (SD)	SD/AU	Average analytical uncertainty (%)	Standard deviation (SD)	SD/AU
Au	2.43	2.56	1.05	4.4	4.20	0.954
Cl	2.47	1.60	0.65	4.5	0.31	0.071
Cs	3.13	1.52	0.49			
Cu	2.60	0.75	0.29	9.8	0.17	0.018
I	2.70	1.09	0.40	4.1	0.96	0.233
La	2.67	2.17	0.81	8.5	0.82	0.096
Mn	5.07	1.55	0.31	3.2	2.57	0.816
V	3.33	0.47	0.14	7.4	7.33	0.997

Ranges of SD/AU:

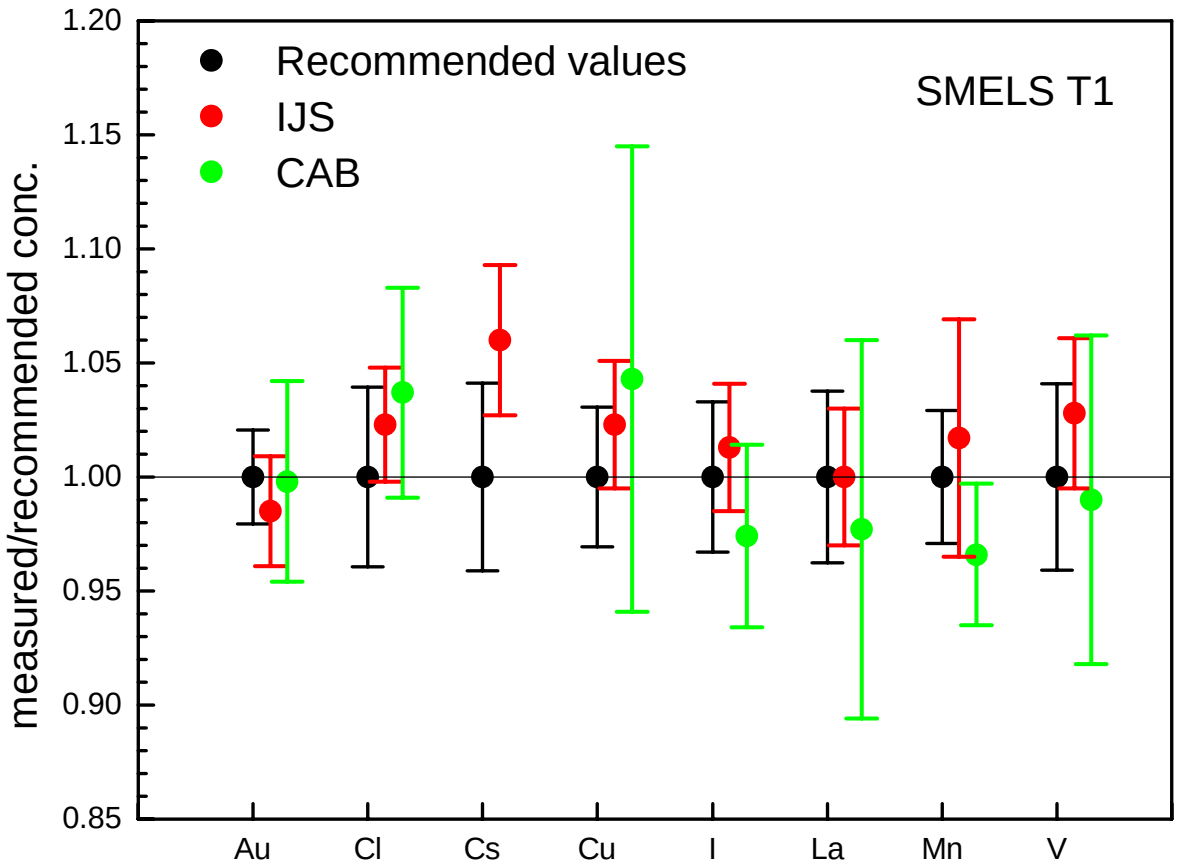
SMELS 1 JSI: 0.15-1.05 CAB: 0.02-0.99

SMELS 2 JSI: 0.16-0.45 CAB: 0.01-0.80

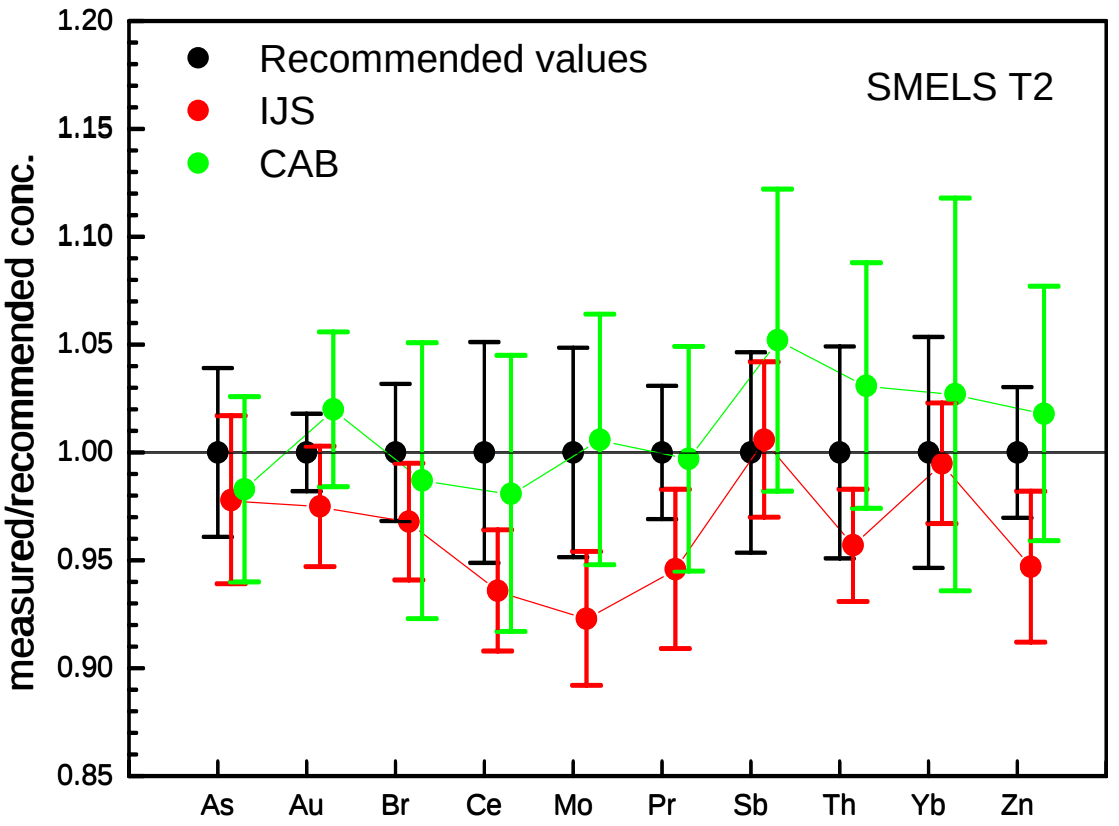
SMELS 2 JSI: 0.15-0.89 CAB: 0.06-0.63

Reproducibility seems reasonable

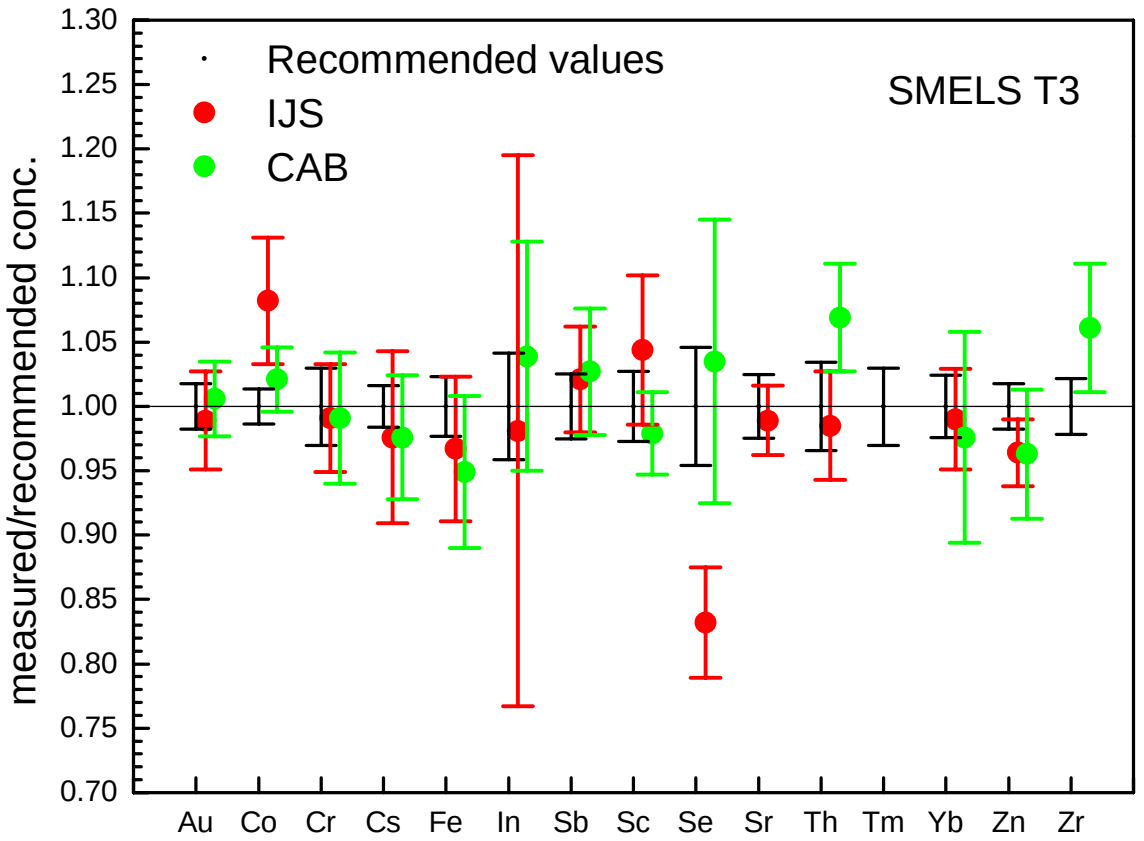
ACCURACY – SMELS 1



ACCURACY - SMELS 2



ACCURACY - SMELS 3



In general terms there is good agreement.

The uncertainties of CAB are higher, especially for Se, In and Th, and there is no determination of Tm. Those are related to the (bad) choice of decay times:

channel		energy	area	unc	
124.57	3.24	63.17	304667.	64571.	99.
130.78	3.24	66.30	4554.	4509.	99.
140.18	2.35	71.03	3702.	716.	2.
143.95	2.35	72.94	7441.	849.	3.
148.50	2.35	75.23	28196.	1058.	5.
159.70	2.05	80.87	8064.	2023.	19.
162.81	2.05	82.44	12146.	2303.	25.
166.52	2.05	84.31	197539.	3132.	10.
171.18	2.05	86.66	29066.	1059.	1.
181.84	2.15	92.04	9393.	1888.	16.
184.88	2.15	93.57	25215.	1527.	6.
187.14	2.15	94.71	131737.	2399.	9.
191.06	2.15	96.68	22212.	1541.	10.
194.60	2.15	98.47	197779.	2758.	12.

channel		energy	area		
	2.26	111.30	51909.	1039.	3.
225.14	2.26	113.86	94834.	1186.	3.
227.58	2.26	115.09	9712.	717.	1.
233.74	1.85	118.20	10595.	664.	1.
239.56	2.02	121.13	62950.	734.	1.
258.19	2.10	130.52	71204.	1677.	1.
269.06	2.06	136.00	206628.	1186.	2.
272.59	2.06	137.78	4404.	916.	1.
282.11	2.22	142.58	4946.	720.	1.
286.62	2.22	144.86	14077.	826.	1.
313.63	1.96	158.47	1120.	569.	1.
350.70	2.15	177.16	112678.	912.	1.

channel		energy	area	unc	
376.58	2.17	190.21	262380.	808.	1.
380.73	2.17	192.30	9918.	584.	1.
391.84	2.21	197.90	169888.	904.	1.
412.42	2.14	208.28	5045.	649.	1.
497.95	2.33	251.39	2225.	471.	1.
516.90	2.19	260.95	5070.	463.	1.
524.02	2.30	264.53	123668.	810.	1.
537.62	2.36	271.39	2102.	590.	1.
553.51	2.33	279.40	49850.	600.	1.
559.41	2.33	282.38	65743.	571.	1.
594.30	2.39	299.96	43805.	814.	1.
601.68	2.21	303.69	1987.	409.	1.
609.41	2.34	307.59	29020.	517.	1.
617.66	2.38	311.74	243754.	902.	1.
633.91	2.38	319.93	55761.	655.	1.
674.32	2.38	340.31	24803.	535.	1.

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- Channel energy area unc
- 743.67 2.49 375.27 3555. 447. 1.
  785.05 2.51 396.13 96052. 542. 1.
  789.44 2.51 398.34 6654. 326. 1.
  793.62 2.51 400.45 15204. 338. 1.
  815.77 2.53 411.62 71119. 578. 1.
  823.62 2.51 415.57 8562. 369. 1.

The end