Institute of Nuclear Chemistry and Technology
Department of Analytical Chemistry
ul. Dorodna 16 03-195 Warsaw POLAND
tel. +4822 504 11 28 Fax: +4822 811 15 32
www. ichtj.waw.pl E-mail: hpolkows@ichtj.waw.pl rdybczyn@ichtj.waw.pl

POLISH CERTIFIED REFERENCE MATERIAL
FOR MULTIELEMENT TRACE ANALYSIS

FINE FLY ASH (CTA-FFA-1)

Fine fly ash (ca. 60 kg) originating from the 3rd zone of electrofilters at Kozienice power station, Poland (over 93% of the material passed through the 0.06 mm sieve); was homogenized by mixing in a plastic drum. After preliminary homogeneity testing (XRF) the material was distributed in 50 g portions into PE bottles and final homogeneity test (Fisher's test) was performed by instrumental neutron activation analysis. Comparison of determined content of Co, Cr, Fe, La, Sc and Th obtained in two series of measurements confirmed good homogeneity of the material for samples weigh of m≥100 mg. All the steps of preparation were performed in conditions preventing contamination with metals. Certification was done on the basis of world-wide intercomparison in which 63 laboratories from 22 countries participated using various analytical methods and techniques. Data evaluation was performed by means of software package SSQC. Several criteria were also employed to decide whether the overall mean can be given the status of recommended (certified) or information value.

CTA-FFA-1 - recommended values

Major elements		**Trace elements**					
Element	Concentration wt, %	Element	Concentration µg/g (ppm)	Element	Concentration µg/g (ppm)	Element	Concentration µg/g (ppm)
Al	14.87 ± 0.39	**As**	53.6 ± 2.7	**Hf**	6.09 ± 0.45	**Sm**	10.9 ± 0.6
Fe	4.89 ± 0.14	**Ba**	835 ± 56	**La**	60.7 ± 4.0	**Sr**	250 ± 13
Na	2.19 ± 0.08	**Ce**	120 ± 7	**Li**	128 ± 22	**Ta**	2.11 ± 0.16
Si	22.48 ± 0.92	**Co**	39.8 ± 1.7	**Lu**	0.658 ±0.043	**Tb**	1.38 ± 0.14
		Cr	156 ± 8	**Mn**	1066 ± 41	**Th**	29.4 ± 0.7
		Cs	48.2 ± 2.6	**Nd**	56.8 ± 3.7	**Tm**	0.705±0.200
		Cu	158 ± 9	**Ni**	99.0 ± 5.8	**U**	15.1 ± 0.8
		Dy	9.09 ± 1.45	**P**	725 ± 74	**V**	260 ± 10
		Er	4.52 ± 1.12	**Pb**	369 ± 46	**W**	10.5 ± 1.1
		Eu	2.39 ± 0.06	**Rb**	185 ± 5	**Y**	45.0 ± 13.5
		F	198 ± 39	**Sb**	17.6 ± 2.5	**Yb**	4.24 ± 0.19
		Gd	10.0 ± 2.6	**Sc**	24.2 ± 1.1	**Zn**	569 ± 58

CTA-FFA-1 - information values

Major elements				**Trace elements**			
Element	Concentration wt, %	Element	Concentration wt, %	Element	Concentration µg/g (ppm)	Element	Concentration µg/g (ppm)
Ca	2.29	**Mg**	1.55	**Be**	27	**In**	0.34
K	2.20	**Ti**	0.58	**Cd**	2.8	**Mo**	17
				Ga	49	**Se**	4.6