

HAZARDOUS AND OTHER ELEMENT CHARACTERIZATION OF NEW AND USED DOMESTIC PLASTIC FOOD CONTAINERS USING INAA AND AAS

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Instrumental neutron activation analysis (INAA) and flame atomic absorption spectroscopy (FAAS) methodology was developed to characterize the inorganic trace element constituents in new and used domestic plastic food containers. INAA was employed through the variation of irradiation, cooling and counting protocols for the determination of Al, Ba, Br, Co, Cr, Eu, Fe, Hg, K, Mn, Na, Nd, Sb, Sc, Th, Ti, V and Zn while FAAS was used to quantify toxic inorganic elements such as Cd, Pb and Cu. These elements are thought to originate from the polymer manufacturing processes. It was found that there was gradual increase in the concentration of most of these elements from new to used plastic samples [1]. Moreover it was also observed that these inorganic elements are present in higher concentrations in the lower grade containers as compared to the high quality containers. It was also observed that the good quality containers even with the long usage do not degrade to such an extent as the low quality containers.

Table 1: Summarized results obtained by FAAS

Container		Element		
		Cd ($\mu\text{g/g}$)	Cu ($\mu\text{g/g}$)	Pb ($\mu\text{g/g}$)
NEW Containers	PL-1	1.73 ± 0.16	10.4 ± 0.31	ND
	PL-2	1.14 ± 0.09	10.3 ± 0.39	ND
	PL-3	1.74 ± 0.11	9.97 ± 0.47	ND
	PL-4	5.10 ± 0.62	11.3 ± 0.62	9.92 ± 0.41
	PL-5	3.5 ± 0.28	9.6 ± 0.28	ND
Used Containers (3-10 years)	PL-6	1.92 ± 0.07	10.3 ± 0.31	ND
	PL-7	1.94 ± 0.11	6.4 ± 0.19	ND
	PL-8	2.16 ± 0.21	5.8 ± 0.27	224 ± 8
	PL-9	4.04 ± 0.19	32.1 ± 1.58	46.6 ± 0.98

ND = Not detected

Reference

1. S. Waheed, S. Rahman, S. M. Husnain and N. Siddique, "Hazardous and other element characterization of new and used domestic plastic food containers using INAA and AAS", J. Radioanal. Nucl. Chem. (in press) DOI: 10.1007/s10967-011-1036-8, 4 March 2011.