FATE OF HALOGENS AT THE SURFACE OF TEKTITES; U. Krähenbühl and M. Langenauer, Laboratorium für Radiochemie, University of Bern, Switzerland.

For years the investigation of the relation of the composition of tektites, the possible target material and of the projectile causing their formation was of main interest of the scientific community active in this field [1,2]. Lately, more detailed studies were performed with the goal to gain information regarding formation, alteration during transport or ejection and weathering of tektites [3,4,5]. In this respect the study of the halogen distribution is of great importance for the investigation of volatilisation processes during impacts, because the 4 elements forming the group of halogens demonstrate quite different volatility. They change their behaviour in the presence of oxidation reagents (e.g., oxygen partial pressure). Iodine shows the highest mobility under oxidising conditions. Meisel et al. [6] have presented results of the halogens in tektites and in impact glasses.
After the investigation of the depth distribution of halogens in Antarctic meteorites [7] it was interesting for us to start a similar study for tektites. A goal of this study was to look for answers for a more detailed understanding of the formation and the transport of these objects. Is it possible to deduce maximum temperatures reached during the formation? What about the duration of the high temperature regime? Can we predict if the tektites were and for which period in a environment with reduced external pressure?

We analysed the following samples of tektites the first by our normal investigation procedure, the stepwise mechanical removal of layers from the outside to the interior. From the second tektite individual parts were characterised: flange, top of tektite (in flight direction) and opposite side.

(1) Thai tektite from an area about 150 km in radius around Khon Kaen.
(2) Tektite from the Nullarbor Plain in Western Australia (exact location not known).

In contrast to ordinary chondrites both tektites were very hard for drilling. So it was very difficult to produce the necessary fine material from thin layers for the analysis of the chemical composition by stepwise drilling.
The halogens were separated from the matrix after irradiation with thermal neutrons by hydropyrolytic decomposition of the material in presence of V_2O_5 as strong oxidising agent [8]. The investigation of the distribution of halogens in tektites from the surface to the interior was the goal of this investigation. For an additional chemical characterisation of the aliquots from the Nullarbor Plain tektite the material was submitted to instrumental neutron activation analysis.
Table 1 presents the results of the determination of the halogens, Table 2 the concentrations of minor and trace elements in the investigated fractions of the Nullarbor Plain tektite.

Discussion: The volume concentrations for the halogens of the two investigated tektites show less than 10% variation (exception Br). Compared to our earlier measurements they are most similar to the halogen pattern of Ivory Coast Tektites [6] . With the exception of Br all the exterior fractions show higher concentrations for the halogens than the one measured for the volume. This can be the result of contamination by material embedding the tektites at the recovering site and/or the alteration from the atmosphere (e.g., sea spray). The different enrichment of F, Cl and I over the volume concentrations for the two tektites reflect in our opinion either the variable degree of halogens disposal at the collecting site and/or different duration of the contamination processes. The weathering of the tektites has certainly also influenced the concentrations of halogens in these objects.
From our results we can only deduce limited information regarding the indicated goals, since the observed contamination on halogens covers any mobilisation of the investigated elements during formation or transport of tektites.

Table 1. Halogens in tektites (ppm). Errors 1s: F and Cl = 5%, Br and I = 10%.

		F	Cl	Br	I
Thai	surface - 0.2 mm	21	34	0.49	0.059
	0.2 - 0.4 mm	24	32	0.15	0.045
	volume	13	1.9	0.18	0.008
Nullarbor	'hot zone' (top)	62	102	0.15	0.059
	'cold zone' (opposite side)	42	88	0.19	0.070
	'molten zone' (flange)	27	6.1	0.38	0.019
	volume	14	2.1	0.47	0.005

Table 2. Minor and trace elements.

		Na (%)	K (%)	Fe (%)	Cr (ppm)	Co (ppm)	Sc (ppm)
Nullarbor	'hot zone' (top)	0.97	2.00	3.7	780	66	10.4
	'cold zone' (opposite side)	0.89	2.00	3.8	1060	53	10.0
	'molten zone' (flange)	0.97	2.25	3.4	67	13	10.6
	volume	1.10	2.08	4.2	54	17	12.7

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