Mobilization of trace elements from the rocks under action of organic acids

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The key role at rock weathering belongs to organic acids, not only creating the aggressive acidic conditions, but also forming stable in water solutions complexes. Quantitative characteristics of trace elements mobilization from ash of the Karymsky volcano (Kamchatka) at its interaction with 0.01 M solutions of organic acids were experimentally determined.

Experimental data have allowed to calculate coefficients of trace elements mobilization k_i (table), equal to values of slope angle in the equations

$$C_i = k_i x_i m,$$

where C_i is concentration of element i in solutions of organic acids after the interaction with rock, μg/l; x_i is element i content in initial substance of volcanic ash (rock), μg/g; m is mass of rock on unit volume of solution, g/l.

The obtained results shown that mobilization of trace elements occurs mainly as a result of demolition of crystal structure of rock-forming minerals, as well as (in case of oxalic acids) at reduction of Fe(III) and Mn(IV) oxyhydroxides to soluble Fe(II) and Mn(II) compounds. Organic complexes formation increases of the metals stability in solution and leads to higher concentrations of its dissolved forms.

Element *i*	$k_i \times 10^3$				
	oxalic acid, pH 2.20	**salicylic acid, pH 2.65**	**tartaric acid, pH 2.68**	**citric acid, pH 2.69**	**acetic acid, pH 2.97**
Li	13.2	5.78	5.56	6.55	3.05
Rb	3.88	2.67	2.67	2.05	2.15
Cs	4.65	3.02	3.49	1.77	2.42
Sr	34.1	16.7	16.5	20.6	8.18
Ba	4.50	4.03	3.26	7.44	0.57
V	311	12.7	10.7	13.3	4.53
Mn	49.5	4.40	4.24	5.58	2.77
Fe	153	8.31	8.58	8.90	3.71
Co	146	11.1	11.3	11.8	7.61
Ni	30.8	5.13	5.02	6.55	2.95
Cu	100.6	106.2	105.6	108.1	94.0
Tl	24.8	15.3	23.4	15.2	8.35
Y	41.8	45.2	40.2	43.7	37.1
Th	39.1	0.32	25.2	30.9	0.24
U	32.6	17.0	20.1	24.0	15.2

Table: Coefficients of trace elements mobilization (k_i) at the interaction of volcanic ash with organic acids solutions.