MELT INCLUSION COMPOSITIONS IN THE PHENOCRYSTS OF THE VOLCANIC ROCKS FROM MEDVEZHYA CALDERA (ITURUP ISLAND, SOUTH KURIL ARC)

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Medvezhya caldera (~ 10 km in diameter) situated in the north-east of the Iturup Island (South Kuril Arc) is a Holocene volcano comprising several young cones. These are composed from basalts, andesibasalts and andesitic pyroclastics as well as dacites exposed on the caldera bottom. In the recent years the caldera became very populas because of the discovery in one of its cones (Kudryavy) of active high temperature (up to 940°C) fumaroles, in which various ore mineralization occurs including very unusial rhenium sulfides (Korzhinsky et al., 1993, Fischer et al., 1998). The stability and high temperature of these fumaroles led some researches to propose their genetic relations with the active magma source situated beneath the caldera. So the study of the composition of magmas from the youngest cones became apparent. It is known that one of the method of studing of magmas themselves but not their products is the study of melt inclusions.

More than 70 melt inclusions in olivine, plagioclase, pyroxene and quartz phenocrysts were studied. We use the techniques of melt homogenization and the analysis of the quenched glasses under electron and ion microprobe. The homogenization temperatures of melt inclusions in the phenocrysts from basalts, andesibasalt and andesites were determined (1280-1330°C in olivine, 1070-1265°C in plagioclase, 1110-1215°C in orthopyroxene), as well as from dacites (900-950°C in plagioclase, clinopyroxene and quartz). The chemical composition of the magmatic melts from Medvezhya caldera is shown in Table.

Table. Chemical composition (wt.%) of magmatic melts of Medvezhya caldera (Iturup Island)

Component	Type of melt					
	picrobasaltic	basaltic	andesitic	dacitic	high-K basaltic	high-K dacitic
SiO_2	43.02	49.17	59.99	68.83	52.22	65.10
TiO_2	0.84	1.10	0.54	0.77	0.41	0.84
Al_2O_3	16.31	14.54	13.64	13.36	18.93	14.40
FeO	10.73	11.42	9.06	4.21	4.56	4.23
MnO	0.17	0.21	0.26	0.11	0.14	0.11
MgO	13.84	7.12	5.29	0.85	6.02	0.94
CaO	12.38	11.27	6.28	4.35	10.07	4.81
Na_2O	1.92	2.72	2.46	3.57	2.44	3.52
K_2O	0.35	0.33	0.93	1.59	4.36	5.90
P_2O_5	0.06	0.08	0.17	0.15	0.13	0.15
H_2O	0.07	0.07	-	1.46	-	-
Cl	0.13	0.13	0.11	0.16	0.02	0.03
S	0.18	0.07	0.04	0.04	0.02	0.02
Total	100.00	98.23	98.77	99.45	99.32	99.99
n	13	9	5	41	2	4
Host	Ol	Ol, Pl	Pl, Opx	Pl,Opx,Cpx,Q	Pl	Pl

n is the number of analyses; Ol - olivine, Pl - plagioclase, Opx - ortopyroxene, Cpx - clinopyroxene, Q - quartz

The composition of melt inclusions in olivine (Fo 88-90) corresponds to pycrobasalts: 43.0 wt % SiO_2, 13.8 wt % MgO, 0.35 wt % K_2O; (ppm) 754-1140 Cr, 85-93 Ba, 6.0-8.0 B, 3.4-4.8 Li, 0.20-0.36 Be. A specific feature of this picrobasaltic melt is high Al_2O_3 concentration and high concentrations of volatiles (0.13-0.25 wt % S, 0.10-0.18 wt % Cl, 0.0-0.21 wt % F). Concentration of H_2O is 0.06-0.09 wt %. The compositions of melt inclusions in plagioclase and orthopyroxene vary from basaltic (49.2 wt % SiO_2, 7.1 wt % MgO, 0.33 wt % K_2O; (ppm) 78 Ba, 6.7 B, 27 Li, 0.8 Be, 0.20 Nb, 13.9 Zr) through

andesitic (60.0 wt % SiO_2, 5.3 wt % MgO, 0.93 wt % K_2O) to dacitic (68.8 wt % SiO_2, 0.85 wt % MgO, 1.59 wt % K_2O; (ppm) 385 Ba, 64 B, 122 Li, 0.8 Be, 1.50 Nb, 136 Zr). Melt inclusions in phenocrysts from dacites are of rhyodacitic-rhyolitic composition. The acid melt contain less S (0.04 wt %) and more Cl (up to 0.29 wt %) и H_2O (up to 2.5 wt %).

As seen from the results (Table) in the majority of cases (68 analysis) magmatic melts have low and intermediate contents of K_2O (0.33-0.35 wt % in picrobasaltic and basaltic melts, 0.93-1.59 wt % in andesitic and dacitic melts). However 6 melt inclusions with very high K_2O content were found (4.4 wt % in basaltic melts and 5.9 wt % in dacitic melts). These melts are characterised by low Cl content (0.02-0.03 wt %). Such high-K melts were found in numerous Kamchatka volcanoes - Avachinsky, Bezymyanny, Karymsky, Sheveluch and other (Tolstykh et al., 1999, 2002). This fact testifies to the partisipation of some K-rich component in the genesis of magmas in the Kamchatka-Kuril region.

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