Genesis of Cocites from North Vietnam: Results of Melt Inclusions Studies in Minerals

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Introduction. We have studied melt inclusions in cocite minerals of North Vietnam (Lacroix, 1933; Wagner and Velde, 1986; Polyakov et al., 1995) with the aim to determine physicochemical parameters of crystallization and to elucidate whether these rocks can be referred to the lamproite family. We also studied lava breccias of the Sin Cao district, which have a similar chemical composition and consist of juvenile clasts and lapilli with syenite and cocite composition as well as xenogenic fragments submerged into glassy groundmass.

Analytical procedures. To homogenize inclusions, we used a high-temperature (up to $1450\pm10^{\circ}$ C) heating stage combined with a microscope. The chemical composition of inclusions (glasses and crystalline phases) was determined using "Camebax" microprobe: the X-ray beam diameter was 2.5-3 μ m, the accuracy of measurement - 1-1.5 wt.%. The fluid phase composition was determined on Raman spectrometer "Ramanor U-100".

Results of investigations. In the minerals of cocites and lava breccias melt inclusions (glassy and partly crystallized inclusions) with alkaline-basic, syenitic, and carbonatitic compositions have been found. They are often separated, but sometimes are localized in one mineral grain: alkaline-basic inclusions are scattered in the grain, syenitic inclusions tend to its peripheral zones, and carbonatitic inclusions are confined to the peripheral zones and fractures.

The alkaline-basic inclusions are found in olivine and clinopyroxene, and they homogenize at 1320-1265 and 1240-1140°C, respectively. The inclusions contain glass and daughter phases with chemical composition typical of lamproites: K-feldspar enriched in BaO and FeO, low-alumina phlogopite, and TiO₂- and Cr₂O₃-rich magnetite. The composition of inclusion glass (Table 1) varies from high-magnesian low-alumina, similar to the composition of olivine and diopside-leucite lamproites (an. 1, 8) to noticeably Al₂O₃-enriched (15-17%) and MgO-depleted (2-5 wt.%). The alkalis are dominated by K, and less often the contents of Na and K are equal.

The syenitic inclusions are found in olivine, clinopyroxene and phlogopite, and they homogenize at 1100-1060°C. The composition of glassy inclusions (Table 2) ranges from trachyte to dacite-rhyolite. The total of alkalis is dominated by either K or Na. The chemical composition of glassy inclusions is similar to that of interstitial glass in lava breccias, but they are slightly richer in Al (Table 2, an 10-12).

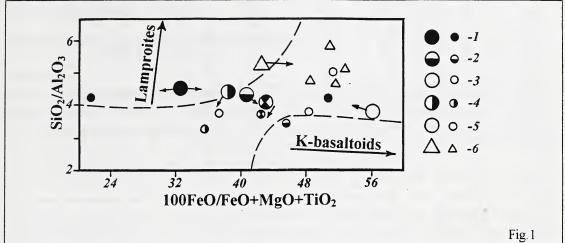
The carbonatitic inclusions are very scarce, and they were found in clinopyroxene and apatite of cocites. They contain (wt.%, n=5): 7-10.8 SiO₂, to 0.8 TiO₂, 2.4-4 Al₂O₃, 1.5-3.6 FeO, 1.4-4.3 MgO, 31-38 CaO, 0.4 Na₂O, 1.6-2.1 K₂O, 0.1 BaO, to 1.5 P₂O₅ and 2.2 SrO. The daughter phases of the inclusions are apatite, albite-oligoclase, and magnetite.

Conclusions.

1. The presence of compositionally different melt inclusions in minerals suggests that *cocites* and *lava* breccias were, most likely, the result from mixing of magmas with alkaline-basic and syenitic compositions. The contrasting composition of juvenile lapilli and clasts in lava breccias is indirect evidence of this conclusion.

2. The high-magnesian low-alumina composition of some inclusions suggests that the alkaline-basic magma initially might have had a <u>lamproitic composition</u>. The potential participation of lamproitic melt in formation of cocites is also indicated by some similar features of minerals from lamproites (Mitchell and Bergman, 1991) and cocites (Polyakov etc., 1997) as well as compositions of crystalline phases from inclusions in cocites.

3. When mixing with syenitic melts, lamproitic magma was enriched in salic components, which is confirmed by a wide occurrence of melt inclusions with intermediate composition (between lamproites and syenites) in minerals of cocites and lava breccias. In Fig. 1, reflecting the position of lamproites and K-basaltoids (Panina, 1995), these inclusions fall into the intermediate field and have abruptly directed trends of transformation, which is typical of mixing media.



1-5 – different samples of cocites and inclusion glasses, respectively. 6 – lava breccias and inclusion glasses, respectively. The pointers show evolution trends for melt diring crystallization. Dashed lines counter the fields of typical lamproites and K-basaltoids.

4. The presence of the direct and reverse zoning in the main minerals (Polyakov et al., 1997) indicates that magma mixing was not homogeneous, and phenocrysts also occurred: in lamproitic magmas - olivine, clinopyroxene, and phlogopite; in syenitic magma - Fe-rich clinopyroxene and phlogopite, K-feldspar, sphene, and Ti-rich garnet. Phenocrysts seem to have overgrown from already mixed melts. According to homogenization temperatures of inclusions, olivine in alkaline-basic magma started to crystallize above 1320, and clinopyroxene - at 1240-1170°C. Most of phenocrysts in syenitic magma crystallized at 1100-1060°C.

5. The appearance of the carbonatitic melt inclusions most likely suggests that the *separation of carbonatitic melt* noticeably enriched in P and Sr occurred at the late crystallization stages of mixing magma. It is worth noting that there is a possibility of detecting carbonatites in the district studied.

6. Among volatiles in syenitic magma the most important was nitrogen (up to 100 mole %), while Cl was negligible (up to 0.64 wt.%). Of appreciable significance in alkaline-basic melts along with Cl (up to 0.4 wt.%) was SO₃ (up to 0.86 wt.%) and, perhaps, of fundamental - CO_2 , which is indirectly evidenced by separation of carbonatitic melt.

References

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e Object n SiO ₂ TiO ₂ Glin PX ₁ 1 41.64 1.03 Glin PX ₁ 1 53.98 0.60 Rock 1 53.98 0.60 Rock 1 53.98 0.60 Rock 1 53.06 0.72 Gla, in PX ₁ 55.30 0.22 Gla, in PX ₁ 2 50.42 0.59 Rock 1 53.24 0.70 Glin, Ol 2 59.82 0.43 Glin, Nx ₁ 2 59.05 0.20 Rock 1 53.24 0.70 Glin, PX ₁ 2 59.05 0.43 Gla, in PX ₁ 2 57.75 0.43 Rock 1 54.22 0.50 Rock 1 54.22 0.50 Gla, in PX ₁ 2 54.22 0.50 Rock 1 54.22 0.50 Gla, in PX ₁ 54.22 0.43 <th>Table 1. Chemical composition (wi</th> <th>nical c</th> <th>omposition (v</th> <th>WL. 70</th> <th>(. %) OF FOCKS and IOW-animina Mg-FICH glasses IFOID Inclusions in miner als</th> <th>AILU IUT</th> <th>A-alumnini</th> <th>I IT BUILT</th> <th>11 610000</th> <th></th> <th>ILIUSION</th> <th>A ILL INFIN</th> <th>1 4100</th> <th></th> <th></th> <th></th> <th></th>	Table 1. Chemical composition (wi	nical c	omposition (v	WL. 70	(. %) OF FOCKS and IOW-animina Mg-FICH glasses IFOID Inclusions in miner als	AILU IUT	A-alumnini	I IT BUILT	11 610000		ILIUSION	A ILL INFIN	1 4100				
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Cocite 4 Gh_i in Px_i 1 57.78 0.51 16.8 5 Rock 1 52.06 0.72 119 6 Gh_i in Px_i 2 55.30 0.23 14.6 Cocite 7 Gh_i in Px_i 2 59.82 0.49 15.6 Cocite 9 Gh_i in Px_i 2 59.05 0.20 12.1 Cocite 11 Gl in Px_i 2 59.05 0.70 12.5 Cocite 12 Rock 1 53.24 0.70 12.1 Cocite 11 Gl_h in Px_i 2 59.05 0.20 14.0 Lava breccia 14 Gl_h in Px_i 2 59.05 0.44 120 Lava breccia 14 Gl_h in Px_i 2 59.05 0.40 14.0 Lava breccia 14 Gl_h Px_i 2 57.75 0.43 11.1 Lava breccia 14 Gl_h Px_i		3	Rock	1	48.01	0.57	10.60	5.46	10.84	11.09	0.58	5.96	0.68	0.50	1	•	98.83**
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Cocite 6 Gl _h in Px ₁ 2 55.30 0.22 14.6 Cocite 7 Gl _h in Px ₁ 2 50.42 0.59 10.2 Cocite 9 Gl _h in Px ₁ 2 59.82 0.49 15.6 Cocite 10 Rock 1 53.24 0.70 12.1 Cocite 11 Gl in Px ₁ 2 59.05 0.20 15.5 Cocite 13 Gl _h in Px ₂ 1 49.31 0.74 12.0 Lava breccia 14 Gl in Px ₁ 2 57.75 0.43 11.1 Lava breccia 14 Gl in Px ₁ 2 57.75 0.43 11.1 Lava breccia 14 Gl in Px ₁ 2 57.75 0.43 11.1 Lava breccia 14 Gl in Px ₁ 2 57.75 0.43 11.1 Lava breccia 14 Gl in Px ₁ 2 57.25 0.43 11.1 Px ₁ - phenocryt: Px ₂		5	Rock	1	52.06	0.72	11.98	6.86	9.34	8.67	2.45	5.11	0.20	0.47	•	•	99.21**
Cocite 7 Gh_i in Px_i 2 50.42 0.59 10.2 Rock 2 59.82 0.49 15.6 Cocite 9 Gh_i in Ol 2 58.21 0.23 17.5 Cocite 10 Rock 1 53.24 0.70 12.1 Cocite 12 Rock 1 55.69 0.46 11.9 Lava breccia 14 Gl in Px_1 2 57.75 0.43 11.1 Lava breccia 14 Gl in Px_1 2 57.75 0.44 11.9 Lava breccia 14 Gl in Px_1 2 57.75 0.43 11.1 Lava breccia 14 Gl in Px_1 2 57.75 0.43 11.1 Lava breccia 14 Gl in Px_1 2 54.22 0.50 14.0 Lava breccia 14 Gl in Px_1 2 54.22 0.50 14.0 Px_1 - phenocryst: Px_2 - small pyrowene grains from groundmass; in brava brecci Pyrachuo homog		9	Gl _h in Px ₂	2	55.30	0.22	14.68	4.77	6.02	6.96	5.43	2.90	0.09	0.40	0.38	0.16	97.39*
8 Rock 2 59.82 0.49 15.6 Cocite 9 Gl _h in Ol 2 58.21 0.23 17.5 Cocite 10 Rock 1 53.24 0.70 12.1 Cocite 11 Gl _h in Px ₁ 2 59.05 0.20 15.5 Cocite 13 Gl _h in Px ₁ 2 57.75 0.43 11.1 Lava breccia 14 Gl ₁ in Px ₁ 2 57.75 0.43 11.1 Lava breccia 14 Gl ₁ in Px ₁ 2 57.75 0.43 11.1 Lava breccia 14 Gl ₁ in Px ₁ 2 57.75 0.43 11.1 Px ₁ - phenocryst. Px ₂ - small pyroxene grains from groundmass; in lava 1 heated up to homogenization and quenched, Gl ₁ - interstitial from lava brecci 0.50 0.50 0.44 0.70 120 , M_2 MnO and LOI (respectively).Me3 - 0.13 and 4.42; Me5 - 0.15 and 120; Me 10.7 0.8 0.7 10.7 Rock Mo Gl in Px <td>Cocite</td> <td>7</td> <td>Gl_h in Px_1</td> <td>2</td> <td>50.42</td> <td>0.59</td> <td>10.20</td> <td>10.13</td> <td>9.05</td> <td>96.6</td> <td>2,19</td> <td>4,09</td> <td>0.07</td> <td>0.69</td> <td>0.35</td> <td>0.02</td> <td>97.79</td>	Cocite	7	Gl_h in Px_1	2	50.42	0.59	10.20	10.13	9.05	96.6	2,19	4,09	0.07	0.69	0.35	0.02	97.79
Cocite 9 Gl _i in Ol 2 58.21 0.23 17.5 Cocite 10 Rock 1 53.24 0.70 15.5 Cocite 11 Gl _i in Px ₁ 2 59.05 0.20 15.5 Cocite 11 Gl _i in Px ₁ 2 57.75 0.43 11.1 Lava breccia 14 Gl ₁ in Px ₁ 2 57.75 0.43 11.1 Px ₁ - phenocryst. Px ₂ - small pyroxene 1 54.22 0.50 14.0 Px ₁ - phenocryst. Px ₂ - small pyroxene grains from groundmass; in lava 1 14.0 10.0 120. b MnO and LOI (respectively).Me3 - 0.13 and 4.12. Me5 - 0.15 and 1.20. Me 17.7 10.2 17.7 Rock NSNE Gl in Px 2 54.82 0.36 17.7 Rock NSNE Gl in Px 2 54.82 0.15 0.15 17.7 Pable 2. Chemical composition (wt.%) 9 60.82 0.93 17.7 10.7 Cocite 5 Gl in Px </td <td></td> <td>8</td> <td>Rock</td> <td>2</td> <td>59.82</td> <td>0.49</td> <td>15.66</td> <td>4.73</td> <td>3.22</td> <td>3.80</td> <td>4.27</td> <td>6.14</td> <td>0.15</td> <td>0.44</td> <td>,</td> <td>•</td> <td>99.55**</td>		8	Rock	2	59.82	0.49	15.66	4.73	3.22	3.80	4.27	6.14	0.15	0.44	,	•	99.55**
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12 Rock 1 49.31 0.74 12.0 Lava breccia 14 Gl _h in Px ₂ 1 55.69 0.46 119 Lava breccia 14 Gl _h in Ap 1 54.22 0.50 14.0 Px ₁ - phenocryst. Px ₂ - small pyrowene grains from groundmass; in lava 1 49.66 0.52 9.44 Px ₁ - phenocryst. Px ₂ - small pyrowene grains from groundmass; in lava 1 49.66 0.52 9.44 MnO and LOI (respectively).Ms3 - 0.13 and 4.42; Me5 - 0.15 and 1.20; Me 17.7 Al ₂ Me Rock NSNe Glass n SiO ₂ 17.7 Al ₂ Rock NSNe Glass n SiO ₂ 0.13 17.7 Rock NSNe Glass n SiO ₂ 0.166 17.7 Rock NSNe Glass n SiO ₂ 0.166 17.7 Cocite 5 Gl in Px 2 54.82 0.06 17.7 Cocite 5 Gl in Px <t< td=""><td>Cocite</td><td>II</td><td>Gl in P_{N1}</td><td>2</td><td>59.05</td><td>0.20</td><td>15.52</td><td>1.61</td><td>2.12</td><td>5.85</td><td>0.70</td><td>11.98</td><td>0.04</td><td>0.47</td><td>•</td><td>•</td><td>97.57</td></t<>	Cocite	II	Gl in P _{N1}	2	59.05	0.20	15.52	1.61	2.12	5.85	0.70	11.98	0.04	0.47	•	•	97.57
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Lava breccia 14 Gl in Px1 2 57.75 0.43 11.1 Px1 - phenocryst. 15 Gla, in Ap 1 54.22 0.50 14.0 Px1 - phenocryst. 16 Rock 1 19.66 0.52 9.48 Px1 - phenocryst. Px2 - small pyrowene grains from groundmass; in lava brack monogenization and quenched, Gl, - interstitial from lava brack 9.44 MnO and LOI (respectively).Ms3 - 0.13 and 4.42 ; Ms5 - 0.15 and 1.20 . Me 70.56 70.56 71.77 Rock MoNe Glass n SiO_2 70.36 17.77 Rock MoNe Glass n SiO_2 70.36 17.77 Rock MoNe Glass n SiO_2 70.36 17.77 Rock MoNe Glass n SiO_2 0.36 17.77 Rock MoNe Glass n SiO_2 0.09 17.77 Rock MoNe Glin Px 2 54.26 0.09 117.77		13	Gl _h in Px ₂	-	55.69	0.46	11.93	5.43	5.33	6.04	2.60	4.42	0.00	0.29	0.75	0.33	93.40*
I5 Gl_h in Ap I 54.22 0.50 14.0 $Rock$ 1 49.66 0.52 9.48 Px_1 - phenocryst; Px_2 - small pyroxene grains from groundmass; in lava brand purp heated up to homogenization and quenched, Gl_1 - interstitial from lava brand procedurely). Mod and LOI (respectively). Mod -0.15 and 1.20 . Mod -0.15 and 1.20 . Mod -0.16 (respectively). Mod -0.15 and 1.20 . Mod -0.16 -0.15 and 1.20 . Mod -0.15 and 1.20 . Mod -0.16 -0.15 -0.15 -0.15 MnO and LOI (respectively). Mod -0.13 and 4.42 . Mod -0.15 and 1.20 . Mod -0.16 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15 -0.15	Lava breccia	14	Gl in Px ₁	2	57.75	0.43	11.18	6.29	5.58	7.85	2.39	3.97	0.14	1	ı	'	95.67
I6 Rock I 49.66 0.52 9.46 Px_1 - phenocryst: Px_2 - small pyroxene grains from groundmass; in lava h head up to homogenization and quenched. GI, - interstitial from lava head up to homogenization and quenched. GI, - interstitial from lava head Dx^2 120 , Me MnO and LOI (respectively).Me3 - 0.13 and 4.42; Me5 - 0.15 and 1.20; Me Dx^2 TiO_2 Dx^2 Table 2. Chemical composition (wt.%) Of trachydacitic glass Dx^2 TiO_2 Dx^2 Rock $MSMe$ $Glin Px$ 2 54.82 0.36 17.7 Rock $MSMe$ $Glin Px$ 2 54.82 0.36 17.7 Rock $MSMe$ $Glin Px$ 2 64.26 0.00 16.6 Cocite 5 $Glin Px$ 2 64.26 0.00 16.6 Rock T $Glin Px$ 2 64.26 0.00 16.7 Cocite 5 $Glin Px$ 2 64.26 0.00 16.6 Cocite 5 $Glin Px$ 2 <t< td=""><td></td><td>15</td><td>Gl_h in Ap</td><td>-</td><td>54.22</td><td>0.50</td><td>14.07</td><td>5.19</td><td>2.94</td><td>12.65</td><td>1.54</td><td>4.36</td><td>0.21</td><td>0.51</td><td>ı</td><td>'</td><td>96.32</td></t<>		15	Gl _h in Ap	-	54.22	0.50	14.07	5.19	2.94	12.65	1.54	4.36	0.21	0.51	ı	'	96.32
Px ₁ - phenocryst. Px ₂ - small pyrowene grains from groundmass; in lava 1 heated up to homogenization and quenched, Gl ₁ - interstitial from lava bre MnO and LOI (respectively).Me3 - 0.13 and 4.42; Me5 - 0.15 and 1.20; Me Table 2. Chemical composition (wt.%) of trachydacitic glass Rock Me Glass n SiO ₂ TiO ₂ Al-C Table 2. Chemical composition (wt.%) of trachydacitic glass n SiO ₂ TiO ₂ Al-C Rock Me Glass n SiO ₂ TiO ₂ Al-C Rock Me Glass n SiO ₂ TiO ₂ Al-C Rock Me Glass n SiO ₂ O.36 17.7 Cocite 5 Gl in Px 2 64.26 0.09 16.6 Cocite 5 Gl in Px 2 64.26 0.01 17.7 Gooite 5 Gl in Px 2 64.26 0.00 16.6 7 Gl in Px 2 64.26 0.00 16.2 8 Gl in Px		16	Rock	1	49.66	0.52	9.48	5.13	6.42	11.12	1.74	3.81	0.29	0.30	1		99.41**
heated up to homogenization and quenched. Gl, - interstitual from lava bre MinO and LOI (respectively). Me3 - 0.13 and 4.42; Me5 - 0.15 and 1.20; Me3 Table 2. Chemical composition (wt.%) of trachydacitic glass n SiO ₂ TiO ₂ Al ₃ C Rock NeMe Glass n SiO ₂ TiO ₂ Al ₃ C Rock NeMe Glass n SiO ₂ TiO ₂ Al ₃ C Rock Jen Gl in Px 2 54,82 0,09 21,3 Cocite 5 Gl in Px 5 64,22 0,16 17,7 Cocite 5 Gl in Px 2 64,26 0,00 16,6 Cocite 5 Gl in Px 2 64,26 0,16 17,7 Rocite 5 Gl in Px 2 64,26 0,00 16,6 Rocite 5 Gl in Px 2 69,75 0,00 16,3 Rocite 5 Gl in Px 2 69,75 0,00 16,3 Rocite 6 Gl in Px 2	Px1 - phenocryst	Px ₂ - s	mall pyroxene g	grains	from grou	ndmass; in	lava breco	sias: pyro	xene from	hasic lap.	illi, apatit	e from m	atrix. Incl	lusion gla	sses: Gl -	- initial u	- initial unheated, Gl _h
Table 2. Chemical composition (wt.%) of trachydactic glass n SiO ₂ TiO ₂ Al ₂ G Rock NeMe Glass n SiO ₂ TiO ₂ Al ₂ G Rock NeMe Glass n SiO ₂ TiO ₂ Al ₂ G Rock NeMe Glass n SiO ₂ TiO ₂ Al ₂ G Rock J Gl in Px 2 64.26 0.09 21.3 Cocite 5 Gl in Px 2 64.26 0.00 16.6 T Gl in Px 1 68.79 0.06 18.9 T Gl in Px 2 69.75 0.00 16.3 Rocite 5 Gl in Phl 7 69.95 0.014 21.0 Rocite 10 Gl in Phl 7 69.75 0.014 17.5 Lava breecia 11 Gl, of rock 3 63.21 0.12 17.5	Man and I OI (r	logeniz	ation and quenc	shed, G	il, - intersti 42: NoS - 0	tial from k	ava breccia	s. *) Tota 109 and 0	1 include	(in wt.%): - 0 13 and	*) Cr ₂ O ₃ : 1 0 89: No	: Nel - 0.3	7; Ne2 - (and 10 76	0.10; Ne6	- 0.08; J№	13 - 0.13	, and also **
<u> </u>	Table 2. Cher	nical c	omnosition (v	wt.%) of trach	vdacitic	plass fro	m inclus	vions in 1	minerals	and inte	rstitial	plass fro	om lava	hreccia		
1 Gl _h in Px 2 54,82 0,36 2 Gl in Px 9 60.82 0.09 3 Gl in Px 5 61.22 0.18 4 Gl in Px 5 64.26 0.00 5 Gl in Px 2 64.26 0.00 6 Gl in Px 1 68.79 0.06 7 Gl in Px 1 68.79 0.06 8 Gl in Px 2 69.75 0.01 9 Gl in Phl 7 64.52 0.14 9 Gl in Phl 7 64.52 0.14 10 Gl of rock 3 63.21 0.12	Rock	NeNe	Glass	u	SiO ₂	TiO ₂	Al ₂ O ₃	FeO	MgO	CaO	Na ₂ O	K ₂ O	BaO	P ₂ O ₅	SO ₃	CI	Total
2 GlinPx 9 60.82 0.09 3 GlinPx 5 61.22 0.18 4 GlinPx 2 64.26 0.00 5 GlinPx 4 65.20 0.16 6 GlinPx 1 68.79 0.06 7 GlinPx 1 68.79 0.06 8 GlinPh 7 60.96 0.14 9 GlinPh 7 64.52 0.14 10 Gl, of rock 3 63.21 0.12 11 Gl, of rock 1 69.15 0.04		-	Gl _h in Px	2	54,82	0,36	17,71	3.14	4.60	6.10	5.05	5,63	0,55	0,27	0,04	0.06	98.33
3 GlinPx 5 61.22 0.18 4 GlinPx 2 64.26 0.00 5 GlinPx 4 65.20 0.16 6 GlinPx 1 68.79 0.06 7 GlinPx 2 69.75 0.01 8 GlinPh 7 60.96 0.14 9 GlinPh 7 64.52 0.14 10 GlinPh 7 69.15 0.14 11 Glofrock 3 63.21 0.12		2	Gl in Px	6	60.82	0.09	21.30	1.29	0,72	1,34	4.97	6.78	0.08	0.48	0.04	0.19	76.76
4 GlinPx 2 64.26 0.00 5 GlinPx 4 65.20 0.16 6 GlinPx 1 68.79 0.06 7 GlinPx 2 69.75 0.01 8 GlinPhi 7 60.96 0.14 9 GlinPhi 7 64.52 0.14 10 Gl, of rock 3 63.21 0.12 11 Gl, of rock 1 69.15 0.04		З	Gl in Px	S	61.22	0.18	18.92	0.58	0.16	1.07	2.11	12.63	0.40	0.54	•		97.85
5 GlinPx 4 65.20 0.16 6 GlinPx 1 68.79 0.06 7 GlinPx 2 69.75 0.00 8 GlinPhl 7 60.96 0.14 9 GlinPhl 7 64.52 0.14 10 Gl _i of rock 3 63.21 0.12 11 Gl _i of rock 1 69.15 0.04		4	Gl in Px	2	64.26	0.00	16.69	0.24	0.30	0.71	2.34	10.89	00.00	0.00	0.00	0.03	95.46
6 Glin Px 1 68.79 0.06 7 Glin Px 2 69.75 0.00 8 Glin Phl 7 60.96 0.14 9 Glin Phl 7 64.52 0.14 10 Gl, of rock 3 63.21 0.12 11 Gl, of rock 1 69.15 0.04	Cocite	S	Gl in Px	4	65.20	0.16	17.79	1.70	0.30	1.97	3.55	6.12	0.02	0.00	0.00	0.39	97.20
7 Gl in Px 2 69.75 0.00 8 Gl in Ol 7 60.96 0.14 9 Gl in Phl 7 64.52 0.14 10 Gl, of rock 3 63.21 0.12 11 Gl, of rock 1 69.15 0.04		9	GI in Px	-	68.79	0.06	18.96	0.28	0.08	0.23	7.56	1.72	0.03	0.02	0.02		77.76
8 Gl in Ol 7 60.96 0.14 9 Gl in Phl 7 64.52 0.14 10 Gl of rock 3 63.21 0.12 11 Gl of rock 1 69.15 0.04		7	Gl in Px	7	69.75	0.00	16.35	0.25	0.31	2.24	5.22	2.60	0.00	0.00	•	0.64	97.42
9 Gl in Phl 7 64.52 0.14 10 Gl, of rock 3 63.21 0.12 11 Gl, of rock 1 69.15 0.04		~	Gl in Ol	7	60,96	0,14	21,07	1,64	0.80	0,17	5.20	8,44	0.10	0.10	•	0.31	98.93
10 Gl, of rock 3 63.21 0.12 11 Gl, of rock 1 69.15 0.04		6	Gl in Phl	7	64.52	0.14	18.53	1.12	0.25	0.94	3.62	9.94	0.17	0.22	0.00	0.00	99.55
11 Gli of rock 1 69.15 0.04		10	Gl, of rock	ŝ	63,21	0.12	17.55	1.67	0.34	0.27	1.89	12.94	0.50	•	ı	•	98.49
	Lava breccia	11	Gl _i of rock	-	69.15	0.04	16.28	1.68	1.41	0.37	5.06	5.77	0.15	•	ı	•	66.66
Gli of rock 3 77.20 0.45		12	Gli of rock	e	77.20	0.45	10.94	0.95	0.53	0.16	3.19	4.63	0.11	•	•	ı	98.16