Zhmodik A.S., Sharapov V.N., Akimtsev V.A., Bobrov V.A. Variation of compositions of basalts in the process of vitrification in near-bottom conditions (Juan-de-Fuca Ridge and Mid-Atlantic Ridge)

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Microprobe studies (tracing of profiles) of thin (1-2 cm) glassy peels spalled in basalt magma consolidation process in near-bottom conditions, and also glassy parts of tubes, have revealed variations of major elements concentrations in the contact with seawater: inconvertible variation aside abatements of Na_2O concentrations in all investigated samples is observed. In a separate sample depressing of K_2O concentration is also observed. Esteeming behavior of Al_2O_3, it is possible to tell, that in whole its concentration or do not vary, or a little bit grow. Distribution of the others main elements in glassy peels is single ended: or their concentrations do not vary, or magnification of concentrations in one and an abatement in another parts of basalt peel is observed slight.

The Idea of use of glassy rocks as measurement standard of "initial" basic liquid is quite obvious - the composition of a glass is closest to a composition and structure of consolidated liquid. Natural glassy basalts contain gas bubbles, crystal grains and liquation drops, which one may be allowed (and more often are allowed) at an estimation of the basic liquid composition, exposed to vitrification. Other estimations of the "initial" melt composition are based on an elemental composition of "whole mass" of basalt. In this case components of liquidus minerals and xenocrysts are allowed, which one may contain in lava, but are leave outed volatiles, carved out from liquid at a crystallization of lava.

Apparently, that the relative dislocation of receivable thus petrochemical and geochemical estimations is instituted by an original phase composition of intruded liquid and nature of its cooling in conduit and on a surface (in our case on a surface of seafloor). In quality of "measurement standard" of glassy basalts magnitude of argument (the content of a separate component), obtained in a sample from glass fringe should be a undisplaced estimation of a composition of all sample. Accordingly, the magnitude of this argument set on by not vitreous part of rock, in turn, should not be "essentially" offset by the modulus relatively to a vitreous part of rock. At casual nature of sampling the relation of separate arguments values on that and other method should converge to a normal distribution about one. Only at such situation there may be justified a choice of glass in quality of "measurement standard" of an investigated sample of lava. The marked circumstances become essential at constructing schemas of basic liquids differentiating in the magmatic centers and analysis of equal balances of a gas phase with liquid and crystals in different magmatic facieses and at dissociation of a source melt. In petrochemical reports (Frey et. al., 1993; Dmitriev et. al., 1990; and others) the specified problem is not discussed expressly, though its relevance is evidently looked through at discussion of compositions of "melt" inclusions in liquidus minerals (Mantle flow and melt generation., 1992; Magmatic crystallization.., 1975; Sobolev, 1996; and others), glassy basalts in xenoliths (Naumov et. al., 1997; and others) and "residual" fluids in basalts of lava lakes (Naumov et. al., 1997). Therefore attempt made to carry out even preliminary analysis under the resolution of the this question on the basis of analysis of a proportion of a composition of lavas and glassy fringes for effusion of practically one-age neobasalts from the shallow plutonic center under an axial rift of the segment Cleft of the Juan-de-Fuca ridge (Dixon et. al., 1986; Smith et. al., 1994).

Ratios of compositions of basalts and glasses are obtained as for all segment, and local for two stations. Particular concern is represented with relations of trace elements concentrations in basalt and liquates, and also their contents in leases of foaming inside flows where registered the submelting of walls of a contraction fractures. The content of porphyritic segregations in lavas does not exceed 5 % and also are practically identical in the investigated samples. The content of "initial" sulphidic segregations in glassy basalts also no more than 5 % (Embley, Chadwick, 1994). Their redistribution in flows, judging by the investigated sections, also is homogeneous. Even at such small content of phases in basalts there are some discrepancies in compositions of glassy fringe of consolidation and basalts. Confrontation of mean contents of main components demonstrates, that the most close compositions have low-titanous glasses and maximum magnesian basalts, which one differ only under the content of potassium. In all other cases there are discrepancies of contents from 3 up to 6 components. Therefore the revealed skewness of compositions of microimpurities in basalts (La, Lu) and glasses (Nd) as we propose, may be referred to influencing these factors. Increasing of contents of microimpurities in basalts and glasses in leases of presence at lavas magmatic ore mineralization (Embley, Chadwick, 1994) may be interpreted as result of a fractionation in the magmatic center. Statistical estimations of the available data on glasses and basalts have shown, that only contents of a lanthanum and terbium in them significantly differ. However correlation matrixs of microimpurities in basalts and glasses are various on many points.

Thus it is possible to draw preliminary conclusions concerning legitimacy of use of the petrochemical data on glassy crusts of consolidation of basalt flows as a "reference" objects for analysis of differentiating processes in the magmatic centers under axial zones of mid-oceanic ridges: 1) there are doubts in correctness of such estimations of an initial composition of the basic liquids entering by a magma conduit from magmatic center; 2) not only porphyritic inclusions, but the composition and the content of a gas phase essentially may influence the content of many trace elements in glassy frothed basalts; 3) we propose, that rather the data of collateral analysis of phase equilibriums in glassy fringe and in basalts allow to estimate a composition of the melt which has arrived in a magma conduit, and nature of a fractionation of a melt in magmatic center more adequately; 4) more consecutively the viewed problem may be resolved at targeted increasing in the number of the statistical data of separate structural areas of their progressing, and on the reference petrochemical groups.

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