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Tectonic fragmentation of mafic melt in Tastau volcano-plutonic ring complex, Eastern Kazakhstan

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Unusual small (1-70 cm) numerous mafic intrusive bodies have been found in Early Carboniferous low-grade folded sediments in the Late Hercynian Tastau volcano-plutonic ring complex (Eastern Kazakhstan). They are closely spaced and have interconnected dike-like, globular and irregular morphologies. Their chilled margins are preserved around all of the observed mafic bodies. The composition of basite is characterized by wide variations of all main chemical elements (SiO_2 = 46,2-61,2 %, Al_2O_3 = 12,6-17,7 %, TiO_2 = 0,55-0,85 %, FeOtot = 3,77-6,87 %, MnO = 0,35-0,68 %, MgO = 2,0-5,64), low alkali contents ($Na_2O + K_2O$ = 0,78-2,9 %) and high contents of CaO (10,8 - 20,7 %). On SiO_2 vs. Na_2O+K_2O discriminant diagram the rock get a field of gabbro, diorites and quartz diorites. Their mineralogical composition is salite, anorthite, zoisite, amphibole and quartz. In some cases were found the liquation structures: the nodules of silicate-sulfide rock within silicate-oxide one. Also the relic glasses of an alumo-silicate melt with atomic ratio of Al/Si = 1 was found out (representative microprobe chemical composition is: SiO_2 = 42,4%, Al_2O_3 = 35,9%, other - 1,42% at total 79,7 wt.%). The mafic bodies in host rocks (metasandstone and metasilstone) are located only in linear zones of a tectonic brecciation. Also they are in the synplutonic diorite-granite-granosyenite massive in the form of spheric and elongate nodules. We believe that the forming of small mafic intrusions was controlled by compressive shear deformations. Progressive stretching during a high-speed deformation was accompanied by intrusion of mafic melt. The magma fragmentation took place at significant decreasing of the viscosity of a metasedimentary matrix in shear flow environment.