

Silicate cluster vaporization: new experimental data

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The vaporization of silicate minerals may be divided into three types: 1) congruent vaporization with dissociation substances in vapor phase; 2) incongruent vaporization; 3) cluster vaporization. Second type is most wide spreader and character for chemically complicated minerals. As a rule in vapor phase the volatile oxides and their dissociation products are prevailed. The third type is least studied. We called it cluster type vaporization. It characterizes the vaporization of molecular blocks or large molecule and occurs at very high temperature and in condition of sharply temperature increase. The volatility of molecular blocks does not depend on the individual volatility of oxides and elements composing cluster. That is why the clusters can content the substances with different individual volatility that may lead to abundance of vapor by refractory elements. In the article there are number examples of cluster type vaporization. They are new experimental data of laser impulse vaporization of minerals such as larnite – $\text{Ca}_2[\text{SiO}_4]$, mervinite – $\text{Ca}_3\text{Mg}[\text{SiO}_4]_2$, plagioclase – An88 and wollastonite – CaSiO_3 . The experiments showered that in vapor condensate, which was carried out from island silicates (larnite and mervinite), the silicates with chain connections are dominated and the molecular clusters with wollastonite and diopside chemical formula observed. The cluster vaporization mechanism may play important role (perhaps decisive role) in element distribution between vapor phase and remnant melt during impact processes. At these cases the use of classical row of oxide and element volatility for interpretation of the residual impact melt composition and the composition of condensate forms may lead to the erroneous conclusions.

Key words: experiment, vaporization, condensation, impact process

Citation: Yakovlev, O. I., Yu. P. Dikov, M. V. Gerasimov, M. I. Buleev (2012), Silicate cluster vaporization: new experimental data, *Vestn. Otd. nauk Zemle*, 4, NZ9001, doi:10.2205/2012NZ_ASEMPG