



The problem of the origin of tektites from Zhamanshin astrobleme

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Tektites (from Greek. Tektós – molten, melted) - are natural glassy formations of yellow, green, but mostly black color, completely fused, that may have different shape and size. According to their composition tektites are high-silicon (acidic) glasses. The content of SiO_2 may reach 88,5%, Al_2O_3 - 20,5%, FeO - 11,5%, and CaO - 8,5%. The presence of Ni and relatively low content of water in comparison with other glasses (only 0.02%, which is 10 times less than in the volcanic glass) is of particular importance. The name to tektites was given by Austrian geologist E. Suess (1900).

Tektites are often denominated according to their location: irgizites and zhamanshinites (river Irgiz and Zhamanshin hole in Kazakhstan), moldavites [river Moldava (modern Vltava, Czech Republic)] filippinites (Philippines), idoshinites (Indo-china), avstralites (Australia), etc.

There is still no generally accepted hypothesis about the origin of tektites: some consider them to be a part of meteorites, others suggest that tektites are the result of the explosion and melting of terrestrial matter that happens when meteorites, asteroids or comets fall down on Earth.

The aim of the present work is to conduct analytic studies of tektites from Zhamanshin crater. We examined 50 samples that are part of the collection from the Zhamanshin crater gathered in 1979 by I.N. Plotnikova during her student field expedition led by P.V. Florenskiy.

For the convenience of the research of tektites during its early stages the authors compiled a morphological classification of the given samples. On the basis of the visual inspection by the help of a magnifying glass we distinguished the following groups of tektites, which are characterized by certain morphological features:

1. Porous (cavernous), black, isometric shape
2. Porous (cavernous), yellowish-brown, isometric shape
3. Elongated, torose
4. Elongated, with glassy luster
5. Elongated, twisted
6. worm-shaped
7. Vitreous, glassy
8. Deformed

The vast majority of researchers believe that the surface of tektites reflects the dynamic resistance of the medium (air) that they were experiencing in their movement. Visual examination of the samples confirms that, and looking at the most tektites, it is difficult not to agree with this idea. Consequently, we can make an assumption that the morphology of tektites depends on the conditions of the genesis (in particular, on the distance and the expansion velocity of tektites).

Aubrey Whymark, a famous contemporary specialist in tektites, also believes that the morphology is associated with the range of expansion of tektites from an impact crater, which, according to his theory, are formed as a result of impact metamorphism. This opinion is shared by many scientists involved in the research of tektites.

In the next phase of the research the samples of all the morphological groups were examined using electron microscopy. During this analysis, we have found non-melted areas of the rock in 3 out of 50 samples (these were the rocks of the 2nd and the 7th groups from our classification). We also detected the features of the surface patterns that testify the impact formation of tektites.