

Skip-'n-atom Lake Superior agates— agates formed in oceanic spilite lava

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I was sent some candidate skip-'n-atom Lake Superior agates a few years ago, and it took all this time to get around to identifying the feldspars in infrared exactly, to identify the host lava. That project, in fact, took 10 years. My classification key of feldspars in infrared I finished last week. No, there is no key based on a graph you have of an unknown to identify feldspar in our science. Google is often an illusion of knowledge, and commonly that knowledge is superficial. Then I went through all my graph archives to check their identification with the key, to see how it holds up. Feldspars have bipolar (two state) polarization effects, that toggle, which makes just ignorantly counting off peaks and troughs to identify feldspars, totally impossible. By far, they are the hardest silicates to study. I had to discover, for example, 3 signature bands of feldspars not listed in the literature at all, and have so far, just been ignored as relevant. Other classification schemes don't work. Authors made them appear to work by gross undersampling using a few rocks.

So all that led to better classification of lavas, which are really silica and feldspar structures. Different silica minerals and different feldspars for different lavas. This allows me to classify the lavas in infrared in exact detail, including mixed lava rocks where one lava erupted up through another lava of a previous eruption. That occurs too.

This specimen host lava is a spilite. That is a sodium basalt from eruption in sea water. This causes the formation of albite (sodium feldspar) instead of labradorite, a calcium-sodium feldspar for basalt. Orange feldspar grains and brown matrix are all albite. The green is epidote. The feldspar grades into anorthoclase, somewhat more potassium in the feldspar.

Some debate if anorthoclase is real, in the literature. The International Mineralogical Association (IMA) claims it is a variety of albite and not a distinct mineral, which web sites like mindat picks up on. That is because the IMA understanding of spectroscopy is based on old science and their understanding of infrared is inferior. It is a very real and distinct feldspar. There are research papers on anorthoclase all the time, ignoring what IMA thinks.

So, based on spilite analysis and agate formed in the volcanic system as it erupted or shortly after, into an ocean means we can have oceanic agates. This batch of specimens from this Lake Superior collector conclusively shows this is possible.

The skip-'n-atoms are spilite agates linked to epidote medium grade metamorphism with albite and anorthoclase. A unique name and unique class of agate. Even in contact with the agate, no feldspar and no epidote and no zeolites have ever been found in the agates themselves so far in my search.

The picture below is an agate surrounded in green epidote, in a Lake Superior spilite lava. All the dark brown and orange is albite to anorthoclase.

The implication of this for those proposing agates formed from weathering is rather stark. There is no weathering to transport water with silica in an ocean. The ocean has no silica. There is no successive infill possible. Silica that is eroded into sea water is grabbed by radiolarians, not basalt to make agate.

