

Change in fayalites with ultraviolet rays and water

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I have been doing an experimental research of weathering on rocks by ultraviolet rays and waters in a junior high school science club since 2002. This time, it aimed to see the reaction of fayalite when it is soaked in distilled water and irradiated with ultraviolet rays.

It is said that there is much basalt that perhaps contains fayalite on Mars surface. Moreover, it is estimated that there was water on Mars surface in the past. Therefore, I think that ultraviolet rays and water are one of the factors which change rocks on Mars surface.

In this research, fayalites, which total weight is about 10g, are put in the test tube filled with distilled water. The diameter of these fayalites is about 3mm~5mm. They are grain shaped and the color is dark green. The test tube is irradiated with ultraviolet rays with their peak wave length of 254 nm. Another experiment was done as a comparison under the same condition but without ultraviolet. The tubes were irradiated with ultraviolet rays for three months. The illuminance of ultraviolet rays is 40w/m² when the experiments were first started.

As a result of this experiment, a lot of light brown powder was generated in both of the test tubes that were irradiated with ultraviolet rays. However, the tube without ultraviolet rays irradiation generated less powder. Therefore, we can conclude that irradiation of ultraviolet rays causes larger amount of the powder. From the result of EPMA analysis, the powder is the amorphous iron oxide hydroxide.

There are many fresh structures that is like hole about 10micron m on uv irradiated fayalite.

But there are few these structures on uv not irradiated fayalite.

Moreover, we can estimate that ultraviolet rays might promote the change of fayalites in the water. It is presumed that water existed in the past on Mars surface.

I think that there is a possibility on the Mars surface that the rocks contained fayalites were oxidized by the water and ultraviolet rays.

Keywords: ultraviolet rays, water, fayalite, iron(III) oxide, change, Mars

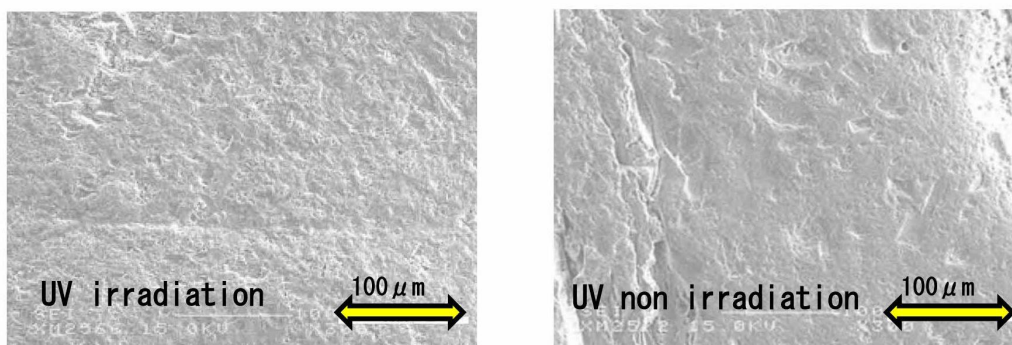


Fig. SEM images of the surfaces of fayalite specimens soaked in distilled water for 3 months with and without UV irradiation.