MINERALOGY AND PETROGRAPHY OF TIRHERT (MOROCCO) EUCRITE FALL

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The eucrites, diogenites and howardites (HED) suit are achondrites originated from the same parent body, the differentiated asteroid 4 Vesta, perceived as the second biggest asteroid orbiting the main asteroid belt after the dwarf planet Ceres. Some earth telescopic observations and spectroscopic mapping Data made during the Dawn mission provided a well detailed geological and mineralogical surface and subsurface (from some Impact craters) composition of this asteroid that is consistent with the composition of the HED meteorites [1], but this is not widely accepted [2].

Eucrites have basaltic textures and chemical compositions showing that they were formed as lava flows or magmatic instrusions, this is why they are perceived as upper crust samples of their parent body. Regarding their mineralogy, their petrography and chemistry, they show a particular diversity and they are classified into cumulate and noncumulate (also basaltic or ordinary) eucrites. The basaltic eucrites define two trends: the Nuevo Laredo trend and the Stannern trend, those two trends shares a common origin: the Main group eucrites. The diogenites are coarse-grained cumulate rocks that shows a wide range of compositions, believed to be the lower crust samples of their parent asteroid. The Howardites shows a lithology that has been related to those two rocks clan, those meteorites contains both eucritic and diogenitic material [3].

Many works were done to understand the evolution and the petrogenesis of the eucrites, diogenites and the howardites suit within their parent body (Partial melting, Fractional and equilibrium crystallization of a magma ocean [4], in-situ crystallization [5], polybaric crystallization and a deep recharge of magma chambers [6]). Most models were suggested based, particulary, on the chemistry of those meteorites (Major/Minor elements, REE).

Only 1093 eucrites were universally collected until now, among them 36 were observed falls (May 8, 2017 [7]). In Morocco, a unique observed fall was signaled among 765 eucrites finds, the collected meteorites name is "Tirhert" [8]. The fall was accompanied with a light phenomena that lasted for about 4 seconds and many sonic booms seen and heard by the residents of Tirhert, Foum El Hisn, Douar Imougadir and nearby villages in southern Morocco. The total weight recovered is 8 to 10 kgs, from a 6 x 3 km and NW SE strewn field [9].

Tirhert meteorite has a very shiny, black fusion crust and shows a light honey brown to white interior. The presence of the plagioclases and the pyroxene grains mainly contribute to its interiors color. This rock is highly equilibrated and classified as metamorphic type 6 eucrite because of its well compositional separation between the low and high Ca pyroxenes [9].

This work aims to understand the petrological context of formation and evolution of Tirhert eucrite, by conducting a mineralogical and petrographic study (optical observation, SEM and EMPA) and to provide more data that can help to modelize and participate to understand the magmatic evolution of its parent body, then to suggest ideas helping on the comprehension of evolution of our solar system. Geochemical study is in progress to get whole rock analyzes and Major/Minor elements composition.

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