HAYABUSA' GRAIN COMPOSITION SHOWS DEFICIENCY OF TROILITE - HOW TO EXPLAIN THIS?

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Delivered by the Hayabusa SC cosmic grains from the Itokawa NEA asteroid show its on the whole chondritic composition but significantly impoverished with dense minerals. Such composition in the Earth-Mars primary accretional zone might be forecasted as it follows from a scenario of differentiation in the protoplanetary accretion disc. This scenario is based on a model of differentiation according to primordial grain densities. This model developed in 1982-1984 [1, 2] considers densities of main minerals composing cosmic bodies. They have span from less than 1g/cm3 to about 8 g/cm3.

In this model primordial matter differentiation occurs in a rotating gas-dust cloud. This cloud consisting of gas and mixture of solids with various densities under rotation produces concentration of heavy particles in the inner zone. This process is well known for prospectors making heavy concentrations (schlich) with use of a spiral separator. There separation of heavies is made by descending and rotating in a spiral water-sand mixture. This model for differentiation of a planetary system was presented at LPSC [1, 2]. At that time nobody could imagine volatile sulfur in the inner hot zone. In [1] is written "It is suggested that primary accretion minerals in some meteorites and probably also in the larger bodies of the Solar system are united by nearness of their densities rather than by temperatures of their condensation out of the protoplanet gas (for example, common association of iron and troilite, association of carbonaceous matter and light Ca-Al rich inclusions in carbonaceous chondrites". Thus iron-nickel metals and troilite could be together in the Mercury's accretion zone.

The more distant zones of the cloud thus become progressively poorer in heavy components. Itokawa is a sample of such zone. The described separation by densities started in the primary cloud continues in zones of planets. This separation leads to the Earth-Moon system and the main asteroid belt division in dense inner part (M-asteroids) and the lighter outer part (C type); S-type is in the middle.

Refersnces: [1] Kochemasov G.G. 1982. Sorting of dust particles in the protoplanet cloud as the cause of forming primary zoned cosmic bodies of various compositions in the Solar system. Abstract # 1206. 13th Lunar & Planetary Science Conference, pp. 397-398. **[2]** Kochemasov G.G. 1984. The latest data concerning the hypothesis of accretion of primary layered planets of different compositions in the Solar system. Abstract # 1227. 15th Lunar & Planetary Science Conference, pp. 437-438.