

A NEW LL5 CHONDRITE FOUND IN BELGIUM IN THE HAUTES FAGNES REGION.

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There are four recognized Belgian meteorites, all falls and all ordinary chondrites: Sint-Denijs-Westrem (a L6 chondrite fallen in 1855), Tourinnes-la-Grosse (a L6 chondrite fallen in 1863), Lesves (a L6 chondrite fallen in 1896) and Hainaut (a H3-6 breccia chondrite fallen in 1934). Around 1965 a meteorite was found in the Hautes Fagnes region in eastern Belgium during a school excursion. It was kept as a curiosity by a teacher, who much later realized that it could be a meteorite. It was brought to the attention of the scientific world in 2007, and it was not until 2009 that adequate analyses took place.

The meteorite found in the Hautes Fagnes has a weight of 185 g and a density of 3.56 g/cm³. It is light grey with somewhat darker angular fragments, and a thin fusion crust. It contains specks of metal of submillimetre size, showing little weathering. Observed under the optical microscope, the meteorite is built up of about 40 % chondrules, of submillimetre size and consisting mainly of olivine and orthopyroxene; the chondrules have no distinct borders. Troilite and iron-nickel were found in the chondrules and in the matrix. Both kamacite and taenite were identified in the metal phase. Native copper has been identified on the contact of troilite and iron-nickel grains. Minor minerals in the matrix include albitic plagioclase, clinopyroxene, chromite, and rare apatite.

The fayalite content of olivine was determined to be 29 ± 6 mol% based on the XRD pattern, and 26 ± 5 mol% with SEM-EDXA, and 22.9 to 25.0 mol% from electron microprobe analyses. The ferrosilite content of orthopyroxene is 30 ± 5 mol% according to SEM-EDXA analyses, and 27.9 to 30.1 mol% according to electron microprobe analyses.

A bulk chemical analysis with ICP-OES after fusion in LiBO₂ yielded 39.38 wt% SiO₂, 24.15 wt% MgO, and 27.72 wt% Fe₂O₃ (total iron oxide) which corresponds to 19.39 Fe (total iron).

The meteorite is distinctly magnetic, with a magnetic susceptibility in the range 12 to 17 x 10⁻⁶ SI as measured with a SM-30 handheld device, the susceptibility being slightly anisotropic.

This meteorite can be classified as a LL ordinary chondrite, based on the presence of chondrules, their size, the metal abundance, the mineralogical characteristics, and the magnetic susceptibility. From the texture, the poorly defined chondrule rims and recrystallized matrix, it can be classified as petrologic type 5 [2]. The minor oxide rims around metal and troilite inclusions indicate a weathering stage W1 [3].

References: [1] V. Vandeginste, H. Goethals, J. Hertogen, D. Lagrou & W. De Vos, 2010. The Hautes Fagnes meteorite: a new LL5 chondrite found in Belgium. *Geologica Belgica* (submitted). [2] Van Schmus, W.R. & Wood, J.A., 1967. A chemical-petrologic classification for chondritic meteorites. *Geochimica et Cosmochimica Acta* 31: 747-765. [3] Wlotzka, F., 1993. A weathering scale for the ordinary chondrites. *Meteoritics* 28: 460.