

JEPARA - A NEW MAIN GROUP PALLASITE FROM JAVA, INDONESIA.

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Introduction: We report here the find and mineralogical characterization of the new main group pallasite Jeparu from Java island, Indonesia. Among the currently 89 pallasites listed in the Meteoritical Bulletin Database, Jeparu is the 8th largest pallasite with a weight of 499.5 kg. The meteorite boulder was almost spherically shaped with the shortest and longest diameters of 70 cm and 85 cm, respectively. It has been found in swampy soil and has therefore developed a rusty weathered crust. X-ray diffraction, electron microscopy, and microprobe and isotope analyses were undertaken to classify Jeparu and to study its history including final terrestrial alteration.

Results: The Jeparu meteorite has been cut through its center using a specifically designed wire saw. Subsequently, several thin sections were made to examine its mineralogy. Optical inspection reveals that the groundmass of the meteorite is weathered, while deep green olivine grains are still fresh. The minerals present in the groundmass are magnetite, nickel sulfide and sulfate (nickelhexahydrite), and schreibersite. The fresh olivine crystals, which are embedded in the groundmass, are coarse-grained (grain sizes of 6 - 12 mm) and rounded; they are homogeneously distributed throughout the entire meteorite. Modal abundances are: olivine (64 vol%), magnetite (23 vol%), nickel sulfide and sulfate (8 vol%), and schreibersite (5 vol%).

Olivine crystals are homogeneous in composition and display a fayalite content between 12 and 13 mol%. The sulfide is almost completely composed of the elements Ni and S, in varying proportion depending on the distance to surrounding magnetite. Magnetite is composed of pure Fe₃O₄ and does not contain any Ni. Schreibersite has the average composition (Fe_{1.85}Ni_{1.15})P.

Replicate analyses of oxygen isotopes were made on acid-washed samples by laser fluorination at the University of Göttingen. These analyses gave: $\delta^{17}\text{O}$ (SMOW), $\delta^{18}\text{O}$ (SMOW), $\Delta^{17}\text{O}$; (1) 1.862, 3.820, -0.130; (2) 1.367, 3.011, -0.200; (3) 1.380, 3.160, -0.280 (per mil).

Discussion: The fabric, mineralogical composition and isotopic signature of Jeparu are fully compatible with its classification as a Main Group Pallasite [1]. The terrestrial weathering of Jeparu resulted in an alteration of the groundmass, whereas olivine remained fresh. Nickel sulfide(s) in the groundmass may represent a replacement product of troilite (FeS), whereas magnetite is an oxidation product of FeNi phases (Kamacite, Taenite). The formation of magnetite and Ni sulfide as secondary phases and the preservation of olivine likely point to weathering in a reducing and rather basic terrestrial environment. Schreibersite is obviously more resistant to weathering than the FeNi metal and is thus preserved as a primary phase.

References: [1] Wasson J. T. and Choi B. G. 2003. *Geochimica et Cosmochimica Acta* 76:3079-3096.

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