

Mineralogy and petrology of TAN057 (C4) and comparison to the CV and CK groups

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TANEZROUFT 057 is a 5.4 kg meteorite classified as C4 (Meteoritical Bulletin n°87). It is a nearly equilibrated carbonaceous chondrite, with olivine compositions around 32 Fa% and low-Ca pyroxenes ranging from 3 to 30 Fs% (average 19). These characteristics would suggest a classification as CK-4, but the meteorite displays abundant dark inclusions (DIs, up to 11 cm) and CAIs (up to 17 mm) that are more characteristic of the CV group. The abundance of matrix seems to be highly variable, from 50 to 80%. Unfortunately, terrestrial alteration impedes the determination of the original abundance of metal.

We investigated the matrix in TAN 057 and compared it to matrices in Vigarano (reduced CV3), Allende and Bali (oxydized CV3), and a suite of CKs of increasing metamorphic degree (DAG 431, CK3-AN; Karoonda, CK4; PCA 82500, CK4-5; EET 90007, CK5; EET 87860, CK5-6; and LEW 87009, CK6).

The matrix of TAN 057 is made of large, texturally unequilibrated olivine grains (median of the CSD c. 75 μm) with large, sometimes zoned, plagioclase grains (up to 100 μm) and minor pyroxene and magnetite. This is similar to the matrix in PCA 82500 (CK4-5) and in some parts of DAG 431 (CK3-AN). Curiously, Karoonda displays a highly clastic matrix different from all the other CV and CK we investigated. Noble metal sulfides, typical of CK4 meteorites (Geiger and Bishoff, 1995, *Planet. Space Sci.*, 43:485), were observed in DAG 431 but not in TAN 057. However, TAN 057 contains a few Au grains < 3 μm . One DI was also investigated in TAN 057; it displays a texture similar to the matrix but a significantly different mineralogical composition with c. 35% of pyroxene.

CVs and CKs seem to be distinct groups on the basis of trace element analyses (Kallemeyn et al., 1991, *GCA*, 55:881), but other arguments point to a possible continuous metamorphic series between oxydized CV3 and CK4 (Greenwood et al., 2003, *MAPS*, 38:A96). TANEZROUFT 057 would probably be best classified as a CV4, but it may also just be the "missing link" between CVs and CKs.