

### THE LINK BETWEEN CV AND CK CARBONACEOUS CHONDRITES BASED ON PARENT BODY PROCESSES.

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**Introduction:** Unlike the other carbonaceous groups, CK chondrites are a metamorphic series from type 3 to type 6 [1]. However, previous studies suggested a possible link between CKs and the CV3 oxidized subgroup [2–5]. We studied CK and CV samples of types 3 to 4 to investigate the petrological relationship between these two carbonaceous chondrite groups.

**Samples:** Our study was carried out on Vigarano (CV3 Red.), Bali (CV3 Ox.), Allende (CV3 Ox.), NWA 779 (CV3 Ox.), NWA 2900 (CV3 Ox.), DaG 431 (CK3-An.), NWA 1559 (CK3), NWA 4724 (CK3.8), NWA 4425 (CK3.8), NWA 4423 (CK3.9), NWA 4422 (CK4), Karoonda (CK4) and TNZ 057 (CK4).

**Results and Discussion:** *Modal abundances of chondritic components.* Matrix, chondrules and CAIs range respectively from 49 to 67.5%, 21.9 to 41.3%, and 9.9 to 11.4%, in CV chondrites, and from 66.4% to 74.9%, 17.8% to 26.9%, and 2.1% to 12.5% in CK chondrites. NWA 2900 values are close to CK3 abundances. Dark inclusions (DIs) are normally typical of CVs [6]; however, NWA 4425 and TNZ 057, both classified as CKs, contain  $17.5 \pm 7.9\%$  and  $11.5 \pm 2.1\%$  of DIs, respectively.

*Matrix textures and petrology.* The matrix of Allende is mainly composed of acicular olivine crystals with avg. size of 6  $\mu\text{m}$ . CK matrices show a unimodal size distribution (DaG 431 excluded), with mean size increasing with petrographic type, from 16.7 to 65  $\mu\text{m}$  for NWA 1559 and TNZ 057, respectively. Olivine crystals are tabular in type 3.8 and become globular in type 3.9/4. In the least metamorphosed CK NWA 1559, olivine crystals are  $\text{Fa}_{36.1 \pm 0.1}$ . In type 4s, matrix olivines are equilibrated around  $\text{Fa}_{32}$ , typically  $\text{Fa}_{32.0 \pm 0.5}$  in TNZ 057. This chemical evolution is correlated with the textural equilibration of the matrix.

*Calcium-Aluminum-rich Inclusions.* All CK3–4 contain fine-grained CAIs. In type 3s, CAIs are dominantly composed of an anorthite-spinel-fassaite-low-Ca-pyroxene assemblage. With increasing metamorphism, fine-grained CAIs are enriched in Fe, and ilmenite and titanomagnetite have crystallized.

*Dark Inclusions.* Estimated bulk compositions of DIs (between the serpentine and saponite lines in the Si-Fe-Mg diagram) indicate a possible aqueous alteration before metamorphism.

**Conclusions:** CKs and CVs show numerous similarities. The CK group could simply be the result of metamorphic reequilibration of the CV oxidized subgroup, rather than a really distinct carbonaceous group. In agreement with geochemical studies [2, 3], our petrological analysis suggests a continuous metamorphic series from oxidized CV to CK chondrites.

**References:** [1] Kallemeyn G. W. et al. 1991. *Geochimica et Cosmochimica Acta* 55:881–892. [2] Greenwood R. C. et al. 2003. *MAPS* 38:A96. [3] Greenwood R. C. et al. 2004. Abstract #1664. 35th LPSC. [4] Devouard B. et al. 2006. *MAPS* 41:A203. [5] Brearley A. J. 2009. Abstract #1791. 40th LPSC. [6] Brearley A. J. and Jones R. H. 1998. In *Planetary Materials*, J. J. Papike (Ed.), Rev. Mineral. 36.