THE CLASSIFICATIONAL WANDERINGS OF THE NINGQIANG CHONDRITE.
Gregory W. Kallemeyn, Institute of Geophysics and Planetary Physics, University of California, Los Angeles, CA 90095-1567. USA.

The Ningqiang chondrite, which fell in China in 1983, was initially classified as a CV3 chondrite [1]. Citing important petrographic and compositional differences between Ningqiang and typical CV chondrites, Rubin et al [2] reclassified Ningqiang as an anomalous member of the CV group (CV3-an). Among the differences were a lower refractory inclusion abundance and lower refractory lithophile abundances in Ningqiang. Clayton and Mayeda [3] implied a possible Ningqiang relationship with CO3 chondrites based on their O-isotope analyses. Kallemeyn et al [4] included Ningqiang with the new CK group because its petrographic properties appeared to be closer to those of the CK group than to the CV group. But they listed it as CK3-an due to distinct compositional differences between Ningqiang and typical CK chondrites. More recently, Guimon et al [5] suggested that Ningqiang is better classified as a member of the CV group because its induced TL falls in a range similar to the CV group and unlike normal CK chondrites which have no detectable induced TL. In an attempt to better understand its compositional classification a complete 'classical' bulk analysis of Ningqiang, was performed to complement previous INAA analyses and are discussed here. Analyses were also performed on Allende (CV3) and the only CK fall, Karoonda (CK4) for comparison. The new Ningqiang data only add to the confusion and support the conclusion that it does not fit well into any of the established chondrite groups.

The complete bulk analyses allowed determination of Si for use as a normalizing element. The new bulk analyses support previous INAA data that showed refractory lithophile element abundances in Ningqiang to be lower than CK and CV chondrites. Because of the large sample size used, the difference is unlikely due to poor sampling of refractory materials. Results discussed here include both new bulk data and previous INAA data. Mean refractory lithophile abundances (Si-normalized) in Ningqiang and the established carbonaceous chondrite groups relative to CI(≡1.00) are CR(≈1.00) < CM,CO(≈1.10) < Ningqiang(≈1.21) < CK(≈1.28) < CV(≈1.35). Moderately volatile lithophile (Mn, Na, K) and siderophile/chalcophile (Au, As, Ga, Sb) element abundances (Si-normalized) in Ningqiang follow patterns very similar to those of CO chondrites. The general trend for moderately volatile elements is: Ningqiang≈CO > CV > CK. But the more highly volatile elements (Br, Se, Zn, S) are much more abundant in Ningqiang than CO and follow the trend: Ningqiang > CV > CO > CK. An interesting result was the high concentration of C determined in Ningqiang (23 mg/g), in contrast to the much lower concentrations found in Allende (2.7 mg/g) and Karoonda (0.2 mg/g). Such a high concentration is in the range of CM2 and CR2 chondrites.

Compositionally, there are no real similarities between Ningqiang and either the CV or CK chondrite groups. The distinctly lower refractory lithophile element abundances and higher volatile element and C abundances set Ningqiang apart from both groups. Petrographically, Ningqiang is most similar to the CK chondrites [4], but O-isotope and TL

CLASSIFICATIONAL WANDERINGS OF NINGQIANG: Kallemeyn G.W. data [3,5] seem not to support such a classification. Ningqiang is probably best left as ungrouped. It is a interesting chondrite that merits more detailed study.

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