A NEW CARBONACEOUS CHONDRITE GROUPLET, CA.

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Introduction: While the majority of carbonaceous (C) chondrites can be assigned to one of eight major groups, some meteorites are less easy to categorize and hence are designated as "ungrouped" [1]. Yamato (Y)-82094 is one such example, having a number of characteristics which distinguish it from other C chondrites: 1) chondrules are highly abundant, 2) chondrule size is intermediate between CV and CO, and 3) the matrix abundance is low, being similar to that of ordinary (O) chondrites. However, the abundance of refractory inclusions, and oxygen isotopic and chemical compositions are typical of C chondrites. Therefore, Y-82094 is an ungrouped C chondrite [2]. Recently, two further unusual carbonaceous chondrites, Asuka 09003 and A 09535 have been reported [3, 4]. Here we present our results for these new chondrites, compare them to Y-82094 and discuss their classification.

Petrography: Y-82094, Asuka 09003, and A 09535 show typical carbonaceous chondritic textures, including abun-dant refractory inclusions (CAI and AOA) (8.2, 4.2, and 6.3 vol.%, respectively). However, chondrules are the most abundant component (78.1, 80.1, and 78.5 %, respectively), with matrix present in low abundance (11.1, 13.0, and 12.6 %, respectively). CAIs mainly consist of melilite, spinel, Ca-rich pyroxene and anorthite with perovskite. Sec-ondary phases in CAIs and AOAs, such as nepheline, are not common in these chondrites. FeO-rich rims to magne-sian olivines in AOAs are usually less than 3μm in width. Average chondrule diameters in Y-82094, Asuka 09003, and A 09535 are 0.33, 0.29, and 0.30 mm, respectively. Type I chondrules comprise olivine, clinoenstatite, and anorthite or weakly devitrified mesostasis. Anorthite often contains thin lamellae of nepheline in Asuka 09003 and A 09535. A silica phase is present in the mesostasis of some Type I chondrules. Fe-Ni metal in chondrules consists predominantly of kamacite, containing fine-grained Ni-rich metal. Type II chondrules in Y-82094, Asuka 09003, and A 09535 are relatively uncommon (0.9, 7.5, and 11.3 % among all chondrules, respectively). The matrix is predominantly FeO-rich, submi-cron-sized, olivine. X-ray diffraction patterns, measured using the method of [5], reflect the major minerals men-tioned above. Phyllosilicates were not identified in these chondrites. Fe-Ni metal is highly abundant in chondrule and the matrix, especially 7.9 vol.% in unweathered Y-82094.

Discussion: Y-82094, Asuka 09003, and A 09535 show similar features to one another and partly resemble type 3 O chondrites. However, the abundant occurrence of CAIs and AOAs is more typical of C chondrites and this affinity is confirmed by their oxygen isotopic and chemical compositions. The petrologic subtypes of Y-82094, Asuka 09003, and A 09535 are low based on the width of the FeO-rich rims to AOA olivines and the abundance of melilite-bearing CAIs. The metal features mentioned above indicate that the subtypes of these chondrites are 3.2 [6]. However, they display a number of individual distinguishing features. Nepheline lamellae in anorthite are common in chondrules from both Asuka 09003 and A 09535, but are not observed in Y-82094, which suggests that the degree of secondary alteration is higher in Asuka 09003 and A 09535 compared to Y-82094. Type II chondrule abundance is different between the three chondrites. In spite of such differences, these chondrites display similar features and are distinguishable from other carbonaceous chondrites based on their high chondrule and low matrix abundances. On the basis of their sampling locations they are not paired. Therefore, these three chondrites may belong to a new carbonaceous chondrite grouplet, which we propose to call "CA", where A refers to Asuka. In the Meteoritical Bulletin database, no similar chondrites appear to have been reported, especially among ungrouped chondrites. However, on the basis of their abundant, small chondrules and low matrix content, it is possible that some potential members of the CA grouplet have been misclassified as type 3 ordinary chondrites, in particular H chondrites.

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