THERMAL/AQUEOUS: ON THE H_2O-Na_2O COMPETITION/COOPERATION IN CARBONACEOUS CHONDRITES (KABA 1, NIPR STATISTICS V.).

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ABSTRACT: Kaba CV3 chondrite exhibits an overall foliated texture, [1] well expressed by the arrangement of inclusion-like objects and and by the fine structure of the matrix. Triggered by the results of Tomeoka and Kojima, [2], Krot, Scott, Zolensky, [3-5], the two stage alteration in such carbonaceous chondrites [6], especially in CM2 and CV3 chondrites, we modelled how aqueous/thermal metamorphism can be observed in bulk compositional data of the meteoritic H_2O and Na_2O contents. We statistically analysed the H_2O and Na_2O compositional data of the NIPR Antarctic Meteorite Catalogue [7], the measurements of Sztrókay et al. [12] and we have found a competition/cooperation trend during the aqeous/thermal evolution of carbonaceous chondrites.

TEXTURE: Over mineralogy of fayalitic olivines and magnetites [1],[3-5], an important observation is connected to aqeous/thermal metamorphism: the overall foliated nature of Kaba [7] and other (Bali, Leoville [13-14]) CV3 chondrites. (The larger elongated inclusions have longer dimensions, in the direction of the overall foliation, and smaller perpendicular to it.) This may refer sedimentary processes touched the surface layers of the CV3 parent body.

THE ENVIRONMENT OF A CARBONACEOUS CHONDRITIC PARENT BODY:

The environment at the meteorite parent bodies is rather unfamiliar; we know practically only the terrestrial chemistry which is seriously different because of 1) enhancement of rare elements by gravitational and thermal properties and 2) the overwhelming dominance of H_2O. The first phenomenon was absent everywhere except the few biggest asteroids as e.g. basaltic Vesta; the second is expected at cca. Jovian distance (cf. the icy Galileo satellites) and outwards (Chiron?). Instead of theoretical constructions we may refer meteorite observations about the possibility of ammonia and ammonium substitution into silicates during Solar System chemical evolution, where both NH_4-ionic and NH_3 "crystal-water-like" constructions were considered [9-11] and buddingtonite and other ammonium silicates were collected). We found small possibility for such minerals in the solar system, because of the overwhelming weight of K over NH_4 and H_2O over NH_3. Similar way of thinking oriented us, that H_2O and Na_2O may also competite for positions in silicates if they are present in the system. However, their competition is not one between equal rank sides, also because the cosmic abundance of H is larger with almost 4 orders of magnitude compared to that of Na. Therefore we hoped to see both competition and cooperation in statistical data.)

STATISTICAL DATA OF H_2O-Na_2O IN CARBONACEOUS CHONDRITES: At present the largest (and also less distorted) database is the NIPR Catalog of Antarctic meteorites [7] of cca. 550 meteorites. We projected Si normalized H_2O and Na_2O data for CI, CM2 CO3, CV3, and 3 type E and ordinary chondrites. These data show the following:

1) In chondrites the average Na/Si ratio is well below the theoretical ratio, the cosmic abundance ratio 0.046 for weight [15]. It seems that either the abundances need corrections or at chemical condensation some Na remained in the interplanetary gas and had different fate.

2) Even accepting this, the Na/Si ratio is extremely low in C chondrites, including C2's, which are however rather primordial.

CONCLUSIONS: *For CM2's there is an expressed anticorrelation between H/Si and Na/Si.* Perhaps this was caused by competition and substitution. *For CO3's there seems also a (not too significant) anticorrelation.* For C3's the water content is much lower than fore C2's; maybe between petrologic types 2 and 3 there was a "drying up", but this is difficult to check because we do not know 2's from E's, H's, L's and LL's. Obviously Na/Si does not depend on petrologic types among C's, so the temperatures in C evolution were not enough to expel Na. We are expecting soon *spherulites of C4 and C5 from the reambulation of the Kaba site,* (1998) because the small droplets of CV3 Kaba mut have undergone more intensive thermal impact (Solt P.[16]). Still, ordinary chondrites show higher Na/Si than C's; maybe this is a surviving trace of their primordial lower H content.

Looking for differentiated and evolved later asteroidal materials, the basalts: the oldest and lest differentiated basalts are very poor either in Na (<0.1 cosmic abundance) or in H. The more differentiated basalts on the diogenite->howardite->eucrite sequence *both* Na *and* H increase; maybe because both alkali "metals" (i.e. Na and H) make lower both specific density and melting point.

SUMMARY: Although the environment at the meteorite parent bodies is rather unfamiliar, and seriously different for our terrestrial thinking (because of enhancement of rare elements by gravitational and thermal properties, and the overwhelming dominance of H_2O), during the hydratation and dehydration process found mostly in CM2 and CV3 chondrites, a competition may be expected between non the participant, but equal rank components of H_2O and Na_2O. This competition may be due to the almost 4 orders of magnitude difference in cosmic abundance between H and Na. This competition seems to be present in the bulk compositional data of different types of carbonaceous chondrites, especially those between CM2 and CO3, which are the most numerous in the NIPR Antarctic Meteorite Collection (Yanai, Kojima, Haramura, 1995). But the early competition turns toward a kind of cooperation at the metamorphoused stages of C3 chondrites.

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