

Tuesday, March 18, 2003
CARBONACEOUS CHONDRITES: WATER AND ORGANICS FOR DUMMIES
1:30 p.m. Marina Plaza Ballroom

Chairs: J. M. Eiler
M. A. Sephton

Housley R. M. *

A Thermodynamic Basis for Extensive Intermediate Temperature Vapor Phase Transport on Meteorite Parent Bodies [#1162]

This work provides a thermodynamic basis for understanding vapor phase transport as hydroxide molecules on meteorite parent bodies.

Zolotov M. Yu. * Shock E. L.

Aqueous Oxidation of Parent Bodies of Carbonaceous Chondrites and Galilean Satellites Driven by Hydrogen Escape [#2047]

We argue and illustrate numerically that profound oxidation that led to formations of sulfates in parent bodies of carbonaceous chondrites and Galilean satellites could have been driven by hydrothermal alteration followed by H₂ escape into space.

Eiler J. M. *

Hydrogen-Isotope Constraints on the Origin and Evolution of the Carbonaceous Chondrites [#1411]

D/H ratios of CM chondrite matrix and whole rocks are correlated with indices of aqueous alteration. These data constrain properties of their protoliths, the source of reactant water, and their relationships to other carbonaceous chondrite types.

McDonough W. F. * Teng F.-Z. Tomascak P. B. Ash R. D. Grossman J. N. Rudnick R. L.

Lithium Isotopic Composition of Chondritic Meteorites [#1931]

Heavily hydrated meteorites Orgueil and Murchison have significantly higher $\delta^7\text{Li}$ values than CV, CO, and CK chondrites. The negative trend in $\delta^7\text{Li}$ values with petrologic grade for bulk chondrites is likely to be due to aqueous alteration processes.

Bland P. A. * Alard O. Gounelle M. Rogers N. W.

Trace Element Variation in Carbonaceous Chondrite Matrix [#1750]

We used laser ablation and solution ICP-MS to analyse the trace element composition of matrix in a range of carbonaceous chondrites. In most cases our results are broadly consistent with an incomplete condensation model of volatile fractionation.

Chizmadia L. J. * Brearley A. J.

Mineralogy and Textural Characteristics of Fine-grained Rims in the Yamato 791198

CM2 Carbonaceous Chondrite: Constraints on the Location of Aqueous Alteration [#1419]

Fine-grained rims in Yamato 791198 are dominated by amorphous to microcrystalline materials. Well-crystallized phyllosilicates are absent. There is no evidence of accretion of a heterogeneous mixture of altered and unaltered materials.

Brearley A. J. *

Nanophase, Low-Ni Metal Grains in Fine-grained Rims in the Murchison CM2 Chondrite: Insights into the Survival of Metal Grains During Aqueous Alteration [#1364]

TEM and EFTEM studies reveal partially oxidized nanophase kamacite grains in fine-grained rims in Murchison. The grains are rimmed by amorphous carbon and magnetite. We suggest that the carbon layer protected the metal from full oxidation during parent body aqueous alteration.

Zolensky M. E. * Le L.

Iron-Nickel Sulfide Compositional Ranges in CM Chondrites: No Simple Plan [#1235]

We present analyses of Fe-Ni sulfides in ten CM carbonaceous chondrites, and discuss the trends with increasing degree of aqueous alteration.

Pizzarello S. * Huang Y. Fuller M.

The Carbon Isotopic Distribution of Murchison Amino Acids [#1036]

The carbon isotopic composition of individual amino acids of the Murchison meteorite was determined by GC-C-IRMS. The carbon composition of the compounds was found to vary significantly from ~ +8 to +53‰.

Cody G. D. * Alexander C. M. O'D. Tera F.

Compositional Trends in Chondritic Organic Solids Within and Between Meteoritic Groups [#1822]

Pure organic residues of a CR2, CI1, CM2, and Tagish Lake meteorites have been completely analyzed using seven independent solid state NMR experiments. Comparing the degree of oxidation of labile organic carbon the degree of oxidation ranks TL > CM2 > CI1 > CR2.

Sephton M. A. * Love G. D. Watson J. S. Verchovsky A. B. Wright I. P. Snape C. E. Gilmour I.

Hydropyrolysis of High Molecular Weight Organic Matter in Murchison [#1619]

Hydropyrolysis of the Murchison macromolecular material releases polyaromatic compounds including phenanthrene, carbazole, fluoranthene, pyrene, chrysene, perylene, benzoperylene and coronene units with varying degrees of alkylation.

Derenne S. * Rouzaud J.-N. Maquet J. Bonhomme C. Florian P. Robert F.

Abundance, Size and Organization of Aromatic Moieties in Insoluble Organic Matter of Orgueil and Murchison Meteorites [#1316]

Characterization of aromatic units in the insoluble organic matter of the Orgueil and Murchison meteorites was performed through solid state ¹³C NMR (with different sequences) and quantitative high resolution transmission electron microscopy.

Marrocchi Y. * Razafitianamaharavo A. Michot L. J. Marty B. Toplis M. J.

Low Pressure Adsorption of Ar, Kr and Xe on Kerogen: Implications for the Trapping of Noble Gases onto Meteoritic Matter [#1699]

Low pressure adsorption (i.e. solar nebula) of Ar, Kr and Xe on kerogen (Q analog) suggest that for environmental temperatures <80K, adsorption could well be responsible for the concentration and subsequent trapping of noble gases in Q.