



Open Research Online

The Open University's repository of research publications and other research outputs

Hydropyrolysis of the organic macromolecular material in the Murchison meteorite

Conference or Workshop Item

How to cite:

Watson, J. S.; Sephton, M. A.; Love, G. D.; Verchovsky, A. B.; Snape, C. E. and Gilmour, I. (2002). Hydropyrolysis of the organic macromolecular material in the Murchison meteorite. In: 12th Annual V.M. Goldschmidt Conference, 18-23 Aug 2002, Davos, Switzerland.

For guidance on citations see [FAQs](#).

© [\[not recorded\]](#)

Version: [\[not recorded\]](#)

Link(s) to article on publisher's website:

<http://camb.demonhosting.co.uk/2002/gold2002/>

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online's data [policy](#) on reuse of materials please consult the policies page.

oro.open.ac.uk

Hydropyrolysis of the organic macromolecular material in the Murchison meteorite

J.S. WATSON¹, M.A. SEPHTON¹, G.D. LOVE², A.B. VERCHOVSKY¹, C.E. SNAPE³ AND I. GILMOUR¹

¹ Planetary and Space Sciences Research Institute, Open University, Milton Keynes, Buckinghamshire, MK7 6AA, United Kingdom (j.watson@open.ac.uk)

² Fossil Fuels and Environmental Geochemistry, NRG, Drummond Building, University of Newcastle, Newcastle upon Tyne, NE1 7RU, United Kingdom

³ School of Chemical, Environmental and Mining Engineering, University of Nottingham, University Park, Nottingham, NG7 2RD, United Kingdom

Carbonaceous chondrites are the most primitive chondrites having escaped much of the geological recycling endured by other solar system bodies and contain several percent indigenous carbon, the majority of which is organic in nature. Less than 25% of this organic component is attributed to the presence of free, readily solvent extractable species. The remainder is present as a predominantly aromatic macromolecular network, this fraction has been relatively poorly characterised. From past studies it is evident that there is a significant interstellar component.

Hydropyrolysis refers to pyrolysis assisted by continuous flow high pressure hydrogen in the presence of a catalyst. This technique has been successfully used in the past to liberate high yields of GC amenable hydrocarbons from a variety of organic macromolecules, while retaining their structures and stereochemistries. This study is the first time this hydropyrolysis method has been applied to extraterrestrial material.

Relatively high molecular weight polycyclic aromatic moieties (characterised by GC-MS) were released from the macromolecule. These included phenanthrene, carbazole, flouranthrene, pyrene, chrysene, perylene, benzoperylene and coronene with varying amounts of alkylation. Aromatic isomers are dominated by the most stable configuration. Comparison with hydrous pyrolysis indicated that hydropyrolysis is more efficient at releasing fragments from the condensed organic macromolecule.

Figure 1: Partially reconstructed mass chromatogram displaying hydropyrolysis products from Murchison macromolecule.

