

ASSESSMENT OF THE AAA PRETREATMENT TECHNIQUE FOR CHARCOAL AND OTHER ORGANIC MATERIALS USED FOR ¹⁴C AMS STUDIES*M. J. HEAD*

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Combustion of wood involves a complex series of physical transformations and chemical reactions that are further complicated by the heterogeneity of the substrate. Wood, and cellulosic materials in general, do not burn directly, but under the influence of sufficiently strong heat sources they decompose to a mixture of volatiles, tarry compositions, and highly reactive carbonaceous char. Gas-phase oxidation of the combustible volatiles and tarry products produces flaming combustion. Solid phase oxidation of the remaining char produces glowing or smouldering combustion, depending on the rate of oxidation.

The production of volatiles leaves a solid residue that is neither intact substrate nor pure carbon, but a different material at various stages of charring and carbonization. The intermediate chars are characterized by the functional groups present (including aromatic and olefinic structures); a high concentration of free radicals trapped in a rigid structure or stabilized by aromatic and olefinic structures; a large surface area; and a high degree of reactivity. All of these depend on progression of the secondary reaction in the solid phase.

Hence, wood charcoal and other organic components of sediments most likely contain relatively stable, but potentially active functional groups that may react with the surrounding micro environment relatively rapidly, or may lie dormant for a long period of time. Treatment of these types of materials with alkali in the presence of air could quite feasibly provide a mechanism for the incorporation of atmospheric CO₂ into the organic structure of the material to form carboxylate functional groups which would not be removed by further acid treatment. This treatment thus has the potential to incorporate younger carbon into the organic samples.

A series of charcoal samples have been analyzed for possible carboxylate functional groups using Fourier transform infra red spectrometry. These charcoals have then been given an acid-alkali-acid treatment without taking the precaution of providing an inert atmosphere, and the resulting residue has also been analyzed for possible carboxylate functional groups. A group of these samples (having apparent ¹⁴C ages >20 k BP) both before and after treatment have been dated using ¹⁴C AMS in order to gauge the possible contamination effect, and the results are presented. The potential for decarboxylation of these materials will be discussed.

THE PROPERTIES OF HUMUS MATERIAL SEPARATED FROM PALAEOOLS IN LOESS-PALAEOLOS SEQUENCES FROM THE LOESS PLATEAU IN CHINA*M. J. HEAD,¹ W. J. ZHOU,² G. JACOBSEN,³ and C. TUNIZ³*

The Loess Plateau of northern China contains loess-palaeosol sequences up to 200 m thick, formed over the last 2.5 myr. These sequences provide an extremely useful record of palaeoclimatic change within this area, and they have been quite well correlated with palaeoclimatic data from δ¹⁸O deter-