

Optimization of supercritical extraction conditions to remove humic acid contamination from archaeological materials for radiocarbon dating

**March 30, 2012**

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In order to evaluate the potential of supercritical fluid extraction for the removal of humic acid contamination prior to plasma oxidation and radiocarbon dating, we conducted a gravimetric study on pure humic acid standards in order to optimize experimental conditions. Synthetic mixtures of known-age charcoal and humic substances were extracted with neat supercritical carbon dioxide, as well as co-solvent modified supercritical carbon dioxide to determine the extent to which contaminating substances were removed. Experimental variables included the use of a co-solvent (modifier), extraction temperature, and extraction pressure. Utilization of supercritical fluid extraction for sample pretreatment would allow archaeological samples to be radiocarbon dated non-destructively.