Accelerator Mass Spectrometry ^{14}C Dating

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Accelerator Mass Spectrometry (AMS) is used for accurate radiocarbon measurements of archaeological artifacts. A ratio of the ^{14}C concentration relative to one of carbon's stable isotopes is used in determining the radiocarbon age of a sample. AMS uniquely provides measurements without interferences of isobars or molecular ions as oppose to other commonly used mass spectrometers. Archaeological artifacts go through a pretreatment process before a measurement age can be obtained. Traditional methods involve an acid-base-acid (ABA) wash followed by combustion pretreatment. ABA chemically removes contamination from artifacts in order to obtain an accurate age. This method puts the sample under extreme conditions and is unfavorably destructive. In my undergraduate research experience at UCA, carbon is converted to radiocarbon by a low-temperature oxygen plasma. Plasma oxidation reduces destruction to the sample. This instrumental method operates under mild-temperatures and replaces both base and combustion processes. Our new objective is to replace the acid pretreatment by use of supercritical fluid extraction (SFE). SFE uses supercritical CO_2 as a solvent to effectively extract and diffuses rapidly through materials with minimal destruction to archaeological artifacts.