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Increasing Extraction Efficiency of Pesticides & Dioxins from Wet Samples using a Novel New Polymer during Accelerated Solvent Extraction

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Accelerated solvent extraction (ASE) is an innovative approach to liquid-solid extraction in environmental and food samples. The ASE technique utilizes elevated temperature and pressure to improve the extraction kinetics of key analytes from their matrices and also improves the extraction efficiency to ensure high recovery. While the ASE technique works well for dry samples, challenges may arise when working with samples with > 10% water content. Extraction efficiencies when extracting volatile or semi volatile analytes from these wet samples are often low, as the analyte of interest may partition between the extracting solvent and the water phase. Traditional pre or post extraction methods of heat evaporation cannot be used for volatile and semi-volatile compounds. Drying techniques that involve mixing the wet samples with an inorganic salt that has a high affinity for the aqueous phase are unsuitable for in-cell extractions. Drying methods with inorganic salts suffer from the limitations of clumping or precipitation making post extraction clean-up difficult. Off-line drying methods like freeze drying are extremely tedious and time consuming.

This study presents the use of a novel new polymer designed to remove moisture from wet samples like soil, tissue and food products and increase the extraction efficiency of volatile and semi volatile compounds. The polymer has a high capacity for water removal (up to 85% content) and does not suffer from some of the limitations of clumping or precipitation observed in some of the traditional drying methods. Data showing recoveries of organochlorine pesticides, polychlorinated dibenzo-p-dioxins, polychlorinated dibenzofurans, and polychlorinated biphenyls in different matrices will be presented. These data compare the use of the moisture absorbing polymer to a sodium sulfate, a standard drying agent that is typically used with ASE methods. Sodium sulfate is prone to clumping when used under high temperature and pressure and use of the moisture absorbing polymer eliminated clumping and produce higher analyte recoveries for all classes of compounds evaluated.