sludge. The residence times for the municipal sludge and industrial excess activated sludge were 4 min and 12 min, respectively. The volume reductions for both sludges were greater than 90%. In subcritical water conditions, a residence time of one hour was required to achieve 90% COD removal for the sludges.

In previous tests with the UT Mark I, the destruction efficiencies under SCWO conditions were greater than 99.99% for chlorinated phenols, 2,4-nitrotoluene, and ethylene glycol.

Industrial excess activated sludge was tested with the UT Mark II. The temperature was increased at a given rate to a desired maximum temperature, and after a predetermined residence time, decreased to an ambient temperature. A COD reduction of 93% was achieved with a residence time of 12 min and a maximum temperature of 400°C.

Similar COD removal efficiencies for both of the sludges were obtained with a continuous flow reactor system. At a temperature of 450°C or above, the COD removal was greater than 95%.

Test results demonstrated that toxic substances and waste treatment plant sludges were efficiently destroyed. The batch, microreactor data were in good agreement with the continuous flow data. Therefore, the batch-microreactor systems can be used to provide kinetic data and assist in the design of continuous flow reactor systems.

Detoxification of polyhaloaromatics via fluoroalkoxylation technology

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Abstract

The goal of this study is to define the chemical reaction parameters necessary to remove one or more halo groups from polyhaloaromatics using the well-

documented fluoroalkoxy substitution reaction whereby halo groups in a polyhaloaromatic are removed and fluoroalkoxy groups are substituted in their place. A series of model polyhaloaromatics have been subjected to the following studies: (1) homogeneous reaction conditions (typical laboratory scale studies to define the chemical reaction), (2) phase-transfer conditions (heterogeneous mixture under pseudo- environmental conditions), (3) environmental sample conditions (oil- based and/or soil–solid samples), (4) biological activity studies in order to make toxicity and mutagenicity comparisons between the polyhaloaromatics and the fluoroalkoxy products. Studies have been completed for the following model compounds: the 1,2,3-, 1,2,4-, and 1,3,5-trichlorobenzenes; the 1,2,3,4- and 1,2,4,5-tetrachlorobenzenes; pentachlorobenzene; hexachlorobenzene; the dibromo- and difluorobiphenyls. In all cases, reaction parameters have been determined and optimized for converting *all* of the polychloroaromatic to mixtures of chloro-fluoralkoxy substituted products. Biological activity screens (an *in vitro* human skin cells test and the Ames test) have been developed for use with samples generated from the reaction chemistry studies.

Development and validation of neutron activation procedures for metal analysis in municipal solid waste

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Abstract

The analysis of solid waste requires a technique capable of detecting heavy metals in large inhomogeneous samples and of carrying out these measurements nondestructively. Within these constraints one of the few techniques with useful capabilities is neutron activation analysis.

Two forms of Neutron Activation Analysis (NAA) were chosen for this study