OAK RIDGE NATIONAL LABORATORY

REMEDIATION TECHNOLOGY GROUP

Based-Catalyzed Destruction of Polychlorinated Biphenyls

Fig. 1. An engineering technologist sets up an apparatus in which PCB-contaminated liquid will be exposed to chemicals which remove the chlorine from the compound, transforming the PCBs into non-regulated chemicals.

Base-catalyzed destruction (BCD) of polychlorinated biphenyls (PCBs) is a process in which the halogen molecules on PCBs are replaced with aliphatic hydrocarbons (or in some cases hydrogen) to convert the PCB into a harmless compound. The BCD technology has been demonstrated on a large scale by the Environmental Protection Agency and was shown to be an efficient treatment for highly PCB-contaminated transformer oils.

Recent studies have shown that a process using water, sodium hydroxide, and polyethylene glycol is very effctive in converting PCBs to harmless compounds. In cases where soil is contaminated with PCBs, the reactant mixture is slurried with soil and heated to 350 °C to destroy PCBs (Fig. 2). Any vaporized PCBs may be condensed and recycled through the reactor or processed in a second stage. The treatment time depends upon the temperature (Fig 2.).

Actual mixed-waste soil from the Oak Ridge K-25 Site was treated to determine the extent of PCB destruction and the fate of radionuclides. The accountability of radioactive components were maintained by measuring activities in the inlet stream (soil) and all the product streams (soil, condensate, and rinse). The results showed that uranium (^{235}U) and cesium (^{137}Cs) appeared to remain in the soil following treatment. The total amount of technetium (^{99}Tc) and rhenium (a surrogate for ^{99}Tc) initially present could not be accounted for in the

product streams, exemplifying the mobility of ^{99}Tc and rhenium.

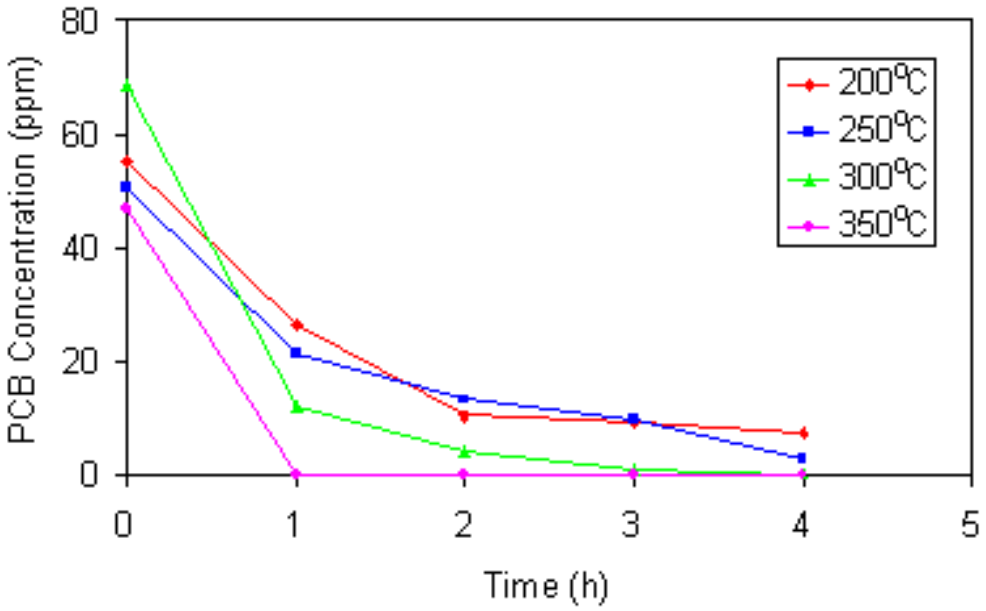

Fig. 2. Increasing the reaction temperature from 250°C to 350°C destroys the PCBs in 1 hour instead of 4 hrs. The residual PCB after treatment was less than 2 ppm.

FOR ADDITIONAL INFORMATION PLEASE CONTACT

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