SCHEMES FOR THE

RECOVERY AND DISPOSAL OF AROCLORS

R. W. Weiss

Improvement of analytical techniques has arrived at a point where parts per billion of stable chlorinated hydrocarbons can be identified. This led to discovery of DDT and more recently of PCB (polychlorinated biphenyl) in the environment, and whereas the harmful effects of DDT are known, PCB's are quite naturally suspected.

This and the current emphasis on pollution prompts the question: what can and should be done to reduce the amount of Aroclor that now finds its way into the environment. Two obvious ways will be dealt with in the following sections: Recovery of Aroclor from the environment by absorption of an organic phase or solute from the medium, air or water. Secondly, the innocuous disposal of spent Aroclor containing fluids will be considered.

I. Recovery of Aroclor dissolved or dispersed in waste water.

Recovery of Aroclors from water or air can be achieved by means of adsorbents or absorbents. Highly selective adsorbents are desirable for an economic process. Active adsorbents are expected to be found under activated clays or earths, zeolites, alumina, dicalite, active carbon, acylated cellulose or other polymers. Aroclor can also be preferentially absorbed on materials like tar, paraffins or waxes. The adsorbing or absorbing agents will be admixed with waste water and allowed to settle in tanks and lagoons. An alternative are suitably packed towers or pipes. The techniques involved are now commonly applied in the treating of industrial or household wastes.

From expensive adsorbents Aroclor will have to be recovered by solvent extraction; cheaper material can be disposed of like any other solid waste after removal from tanks and towers, drying or pressing.

A screening program for the most suitable absorbers will be greatly facilitated by the excellent and sensitive analytical techniques available to identify Aroclors.

II. Disposal of Aroclors

Large amounts of Aroclors will have to be disposed of in the foreseeable future at a rate of 10 million pounds a year. A considerable fraction of this will be contaminated with mineral oil and phosphate esters from our industrial hydraulic business. The following methods for disposal have been suggested.

A. Oxidative Degradation

The simplest method of disposal one would consider is burning in presence of a combustible carrier in a hot furnace. There evolve considerable quantities of highly corrosive hydrochloric acid and chlorine which have to be scrubbed. Hydrochloric acid could in principle be recovered. The combustion can be carried out in presence of chlorine binders. The use of lime for this purpose requires a suitable setup for cleaning the furnace. Also feasible is the use of scrap iron or tin cans as binders. The chlorine from Aroclor presumably could be recovered as ferric chloride and stannic chloride.

B. Pyrolytic Degradation

Pyrolysis under reducing condition with Ni catalyst and ammonia could lead to progressive dehalogenation above 270°. Exhaustive chlorination above 300° should produce lower chlorinated olefins, e.g. C_2Cl_4, C_3Cl_6, etc. The destructive chlorination technique might also be promoted by and carried out in conjunction with a tin recovery operation using tinned cans. Thus pyrolytic overchlorination of waste Aroclor in the presence of scrap Fe° and Sn° would afford $FeCl_3$, $SnCl_4$ and the lower perchlorinated alkanes (i.e. C_2Cl_6) all of which are volatile, separable and have recovery value.

C. Other Miscellaneous Methods

Other methods suggested for disposal of Aroclor include roasting with sulfidic ore, possibly in presence of coke; adsorption on clay and burning, adsorption on suitable carriers and burying and partial condensation on an acidic catalyst increasing the molecular weight to render the material innocuous.

The methods under A. are suitable for contaminated Aroclor whereas the processes under B. and C. are probably only practical with material having a high content of Aroclor.

October 8, 1969