M. COMPETITIVE ACTIVATED CARBON ADSORPTION OF SELECTED ORGANIC PRIORITY POLLUTANTS IN AN INDUSTRIAL WASTEWATER. J.K. Smith, S.C. Lynch and C.J. Dotge. Gulf South Research Institute, Physical and Engineering Sciences Division, New Orleans, Louisiana, 70186 and F. Drydon, Walk Haydel & Associates, Inc., New Orleans, Louisiana, 70130.

Activated carbon and XAD-4 resin have been evaluated for removal efficacy of five priority pollutants from a complex, highly concentrated waste stream. In equilibrium and laboratory bench scale dynamic studies the competitive adsorption of chlorobenzene, dichlorobenzene, nitrobenzene, 1,6-dinitrotoluene and phenol have been evaluated in an industrial waste matrix where priority pollutants account for less than 20% of the total organic load. The activated carbon studies reveal that the chlorinated benzenes are not removed as efficiently as the nitrated aromatic compounds. Thermal and low pressure steam regeneration of the carbon does not significantly alter the adsorption pattern. Performance of the XAD resin is compared to that of the carbon for selective removal of the listed compounds.

REMOVAL OF PCB's FROM WATER BY ACTIVATED CARBON IN THE PRESENCE OF HUMIC ACIDS. M. Pirbazari, and W.J. Weber, Jr. Environmental and Water Resources Engineering, Engineering Building 1-A, University of Michigan, Ann Arbor, Mi. 48109

The introduction of PCB's to the aquatic environment is multifaceted and extensive. The toxicity of PCB compounds places them high on the list of environmentally important pollutants. Activated carbon has demonstrated potential for removal of such compounds. The study described in this paper focuses on quantification of the effectiveness of carbon for removing PCB's from water supplies in the presence of humic acids. The paper presents a detailed evaluation and characterization of adsorption parameters in single-component and multi-component systems. Further, the paper discusses the results of investigations of different experimental conditions and types of reactors that can be used in conjunction with PCB adsorption studies.

REMOVAL OF SPECIFIC ORGANIC CONTAMINANTS FROM WASTEWATER BY ACTIVATED CARBON ADSORPTION. S.A. Baeudet,[1] E.M. Keller,[1] L.J. Bilello,[2] and R.J. Turner[3]. [1]Environmental Science and Engineering, Inc., P.O. Box 13454, Gainesville, FL 32604, [2]Ci Americas, Inc., Wilmington, DE. 19897; [3]U.S. Environmental Protection Agency, Industrial Environmental Research Laboratory, Cincinnati, OH.

Current legislation and Federal court decisions, including the 1977 Clean Water Act (PL 95-217) and the Flannery Toxic Pollutant Settlement Agreement, are resulting in an emphasis upon the control and treatment of specific organic compounds (priority pollutants) in industrial wastewater. Although granular activated carbon (GAC) has been known for decades to be effective in removing specific organics from wastewater, very little information is available on the performance of GAC for removal of priority pollutants in real world waste streams. This paper presents the results of a two-year study conducted for the U.S. Environmental Protection Agency Industrial Environmental Research Laboratory. The study involved the operation of specially designed, pilot-scale GAC column adsorption systems at four organic chemical plants in the United States.

WEDNESDAY MORNING - SECTION B - SYMPOSIUM ON VIRUS REMOVAL IN WASTEWATER TREATMENT - (CONTINUED) - M. M. Reddy, Presiding

10. THE RELATIONSHIP BETWEEN POLIOVIRUS ADSORPTION AND SOIL PROPERTIES. D. E. Torrey, G. W. Pobo, M. M. Reddy and R. E. Moore. New York State Department of Health, Division of Laboratories and Research, Empire State Plaza, Albany, New York, 12201.

The adsorption of radiolabelled poliovirus type 2 by a wide range of soils, clay minerals, and finely ground rocks from suspension in a synthetic freshwater was studied. Batch adsorption experiments were performed with about 10^9 to 10^9 infectious particles per gram substrate. The amount of virus adsorbed varied from approximately 60% to 99.99%; however, most materials adsorbed between 95 and 99.5% of added virus.

A number of soil properties, such as pH, surface area, selected elemental composition, exchange-, hydroxylamine- and nitric acid-extractable components, organic content, ability to adsorb polyelectrolytes, and electrophoretic mobility were determined. The

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Ba, and K. Those species for which fish of widely differing weights were analyzed, larger fish had higher concentration of trace elements than smaller fish. It seems that saltwater rather than freshwater fish have more trace element contents. Variations in trace element levels found in this study probably reflect differences between species and differences in size, life histories, dietary habits, and concentration in the marine environment.

7. HALF-LIFE OF POLYCHLORINATED BIPHENYL (AROCLOR 1254) IN FISH FROM AN ALABAMA RESERVOIR AND STREAM. Chong-i Paul Lo, Mary W. Vitter, Robert S. Reimers, Gerald E. Gunning, and Ann C. Anderson. Tulane University School of Public Health and Tropical Medicine, 1430 Tulane Avenue, New Orleans, LA 70112.

Data from an eight year (1969-1976) field study for PCB's (Aroclor 1254) in fish along Choccoloco Creek and Logan Martin Reservoir in Alabama were analyzed. Two additional years of collecting field data completed the study. Four fish collecting stations were established. Station #1 was a control station miles above the mouth of Snow Creek (which is known as the discharging point by the PCB's plant of Monsanto Chemical Co.). Station #2 and #3 were downstream along Choccoloco Creek and Station #4 was at the Logan Martin Reservoir. Concentration of PCB's (Aroclor 1254) in fish tissue were analyzed to determine accumulation patterns over time and to calculate the half life of the compound for the various fish species. A decreasing concentration of PCB's (Aroclor 1254) in fish was observed from samples taken in Choccoloco Creek. The half lives for individual species range from 18.0 to 27.8 months with good statistical correlation within individual species. The average half life for PCB's (Aroclor 1254) for all species was 21.2 months. In contrast, fish sampled in Logan Martin Reservoir (Bass and Longear Sunfish) showed increasing PCB concentration over time. Based on uptake data, the projected time for doubling PCB concentration is 46 months for Longear Sunfish and 61 months for Bass. This increasing trend may be due to the availability of PCB's because of transport of suspended and colloidal material downstream from Choccoloco Creek. Different uptake patterns in fish taken from stream and reservoir will be elucidated.

8. SOLUBILITY OF SOME ORGANOTIN ANTIFOULANTS IN AQUEOUS SOLUTIONS. M. Ōccan and M. L. Good, Division of Engineering Research, Louisiana State University, Baton Rouge, Louisiana 70803.

Trialkyl and triaryltin compounds are well known for their biocidal, antifungal and antifouling activities. Tributyltin and triphenyltin derivatives in particular have found extensive use as toxicants in marine antifouling coatings. These materials are toxic to a wide spectrum of marine organisms and in order to develop efficient antifouling coatings which result in minimal environmental insult, a complete understanding of the aqueous chemistry of these compounds is essential. This report describes a complete quantitative analysis method for low concentrations of organotins in aqueous solution and the determination of the aqueous solubilities of a variety of tributyl and triphenyl organotins as a function of pH in distilled water and in artificial seawater. The organotins are concentrated by solvent extraction and directly determined by an adaptation of the dithizone spectrophotometric method. The solubility decreases significantly in basic solution and in seawater. The results can be explained in terms of the ionic solubility of the organotins.

9. A STUDY OF ORGANOTIN COMPOUNDS IN AQUEOUS SOLUTIONS USING EXTRACTION TECHNIQUES. C. P. Monaghan, Department of Chemistry and Physics, Northwestern State University of Louisiana, Natchitoches, LA 71457; V. I. Kulkarni, Department of Chemistry, P.G. Center, Gulbarga - 585105, India; M. Ozcan and Mary L. Good, Division of Engineering Research, Louisiana State University, Baton Rouge, LA 70803.

Organotin compounds of the type $(n\text{-}C_4H_9)_3SnY$ are used as toxicants in marine antifouling coatings. Although the coating matrix is thought to control the release of toxicant from the coating to the seawater environment, little information is known concerning the reactions of these organotin compounds with water. In order to gather more information concerning these reactions, a variety of triphenyltin and tributyltin compounds were suspended in distilled water and artificial seawater, and the dissolved components were recovered by extraction with chloroform. Residues recovered from the chloroform extracts were examined using thin layer chromatography and infrared spectroscopy. In most cases either Bu_3Sn- or ϕ_3Sn- were identified to be the primary soluble component. Triphenyltin chloride evidently underwent considerable degradation in solution as ϕ_4Sn, ϕ_3Sn-, ϕ_2Sn-, ϕSn- moieties were identified using thin layer chromatography. Structures such as R_3SnOH and $R_3SnOSnR_3$ can be eliminated as possible soluble species since ν(O-H) and ν(Sn-O-Sn) stretching vibrations were absent in the infrared spectra of the residues.

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