Monsanto

FROM (NAME & LOCATION): R. E. Hatton - St. Louis-B2SD

DATE: September 15, 1976

cc: R. F. Garnsworthy-5020
D. Wood

SUBJECT: PCB/PLESSEY-DUCON

REFERENCE: GWO to DW, 9/9/76

PCB Questions

TO: G. W. Oxer-5020

Subject memo requests information on chemical methods to convert PCBs to easily disposable products. A number of methods have been proposed and reported in the literature. The only one to achieve commercial and practical success that I know of is incineration (complete oxidation) under conditions insuring conversion to hydrogen chloride, carbon dioxide and water with removal of the hydrogen chloride from the gas stream before exhausting to the atmosphere. Such conditions are covered in the Askarel Guide. Incineration is used primarily for liquids with solids being placed in landfills approved for disposal of toxic and hazardous substances.

Recently, work has been underway to dispose of PCBs by destruction in cement kilns during cement production. The U. S. EPA has sponsored some tests and their report should be available in the near future. Details are now proprietary with the company doing the work.

Other methods besides oxidation for PCB destruction that have been suggested are removal of chlorine by various reductive technics, photodegradation and attack by microorganisms. The attached copy of an article describes one company's attempt to commercialize a new reductive system - I have had no report on experience with the unit.

Please let me know if you have further questions. Unfortunately, there are no easy, cheap methods to get rid of PCBs.

R. E. Hatton

R. E. Hatton

/deb
Attachment

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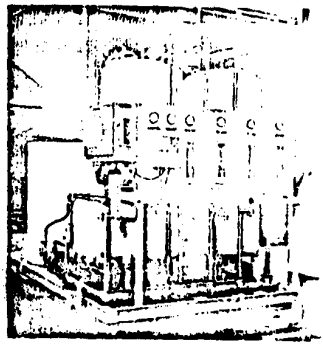
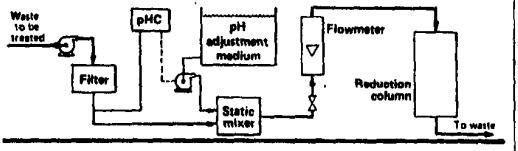
Process gobbles up chlorinated compounds



This catalyzed reduction system removes chlorinated pesticides from effluent streams. And tests indicate that the method may be effective in getting rid of PCB's and reportedly carcinogenic "light ends," too.

☐ This treatment process, which uses a catalyzed-iron reducing agent, reduces the small amounts of water-soluble chlorinated compounds found in effluent streams of plants making or using such substances to within acceptable federal limits. These effluent streams, generally containing 1 ppm or less of chlorinated toxicants, are difficult to treat economically because of the low concentrations of the materials. But field tests at a chlorinated-pesticide plant have shown that the firm's catalyzed reduction system can lower the chlorinated-compound concentration of an effluent stream from 100 ppb–1 ppm to 10 ppt–1 ppb.

Laboratory tests conducted by the manufacturer show that materials amenable to the system's reductive degradation method include: cyclodiene pesticides, such as aldrin, dieldrin, and endrin; DDT and related materials, such as DDD and methoxychlor; the chlorinated camphene, toxaphene; the chlorinated cyclohexane, lindane; and the chlorinated phenoxyacetic-acid herbicides, 2,4-D and 2,4,5-T. Indications have also been seen, says the company, that the system can also remove "light ends," such as chloroform, carbon tetrachloride and ethylene dichloride. And the firm is optimistic that the process can reduce polychlorinated biphenyl (PCB) levels in effluent streams. In recent tests, the treatment system reduced the PCB concentration of an effluent stream from a saturated level of 200 ppb to less than 1 ppb.



System reduces chlorine-compound content

The firm estimates the total cost of the system (reagents, operator, maintenance and supplies, utilities and amortized capital investment) to be about $0.72/1,000 gals treated, based on a 100-gal/min unit (photo). The units come skid-mounted and consist of 25-gal/min modules. Thus, if a plant expands, additional modules may be added to maintain required capacity. For very large treatment systems, larger-than-25-gal/min modules can also be fabricated.

STRAIGHTFORWARD PROCESS—Treatment begins (see flowchart) with a filter that can be a cartridge, sand, carbon or other type, depending on the characteristics of the effluent being handled. Additional flowstream purification, such as oil removal, etc., would also be done at this point. Following pH adjustment (the company indicates the optimal pH is 7), the effluent is metered into a reduction column that contains an iron powder (100–200 mesh) reductant in a sand-bed matrix.

The maker uses an unidentified metallic catalyst that attaches to the iron and enhances the reduction reaction. According to the company, the catalyst gives a more complete reaction by speeding up the reduction and limiting the number of intermediates formed.

Iron powder costs about $0.28/lb, and the catalyzed iron powder just a few pennies more, according to the manufacturer. Because of the small amounts of toxicants actually removed, the reduction bed should last a long time before needing replacement; the present estimate for a 100-gal/min unit is a year or longer. The

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bed for such a unit contains 3,000 lb of iron powder and 12,000 lb of sand.

Other metal reductants besides iron may be used, but the maker notes that the use of iron avoids toxicity problems connected with other metals.

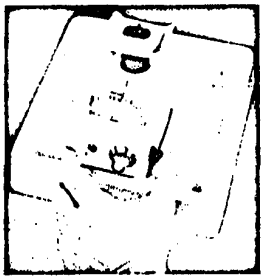
COMPATIBLE SYSTEM—The treatment system operates at ambient temperatures. A small pressure, supplied by a pump, is sometimes needed to regulate flowrate. Materials of construction vary to meet the needs of individual effluent streams.

The manufacturer sells complete systems and will provide startup assistance as needed.—*Envirogenics Systems Co., El Monte, Calif.* 351

Digital thermometer

About the size of a pocket calculator, the Model 232 hand-held, digital thermometer is precalibrated to National Bureau of Standards specifications and needs no zeroing or range selection.

Using standard batteries, the instrument features a display readable to 0.1°F and is accurate to ±0.5°F across its range of -55 to 240°F.—*Veritronix, Inc., Evergreen, Colo.* 364



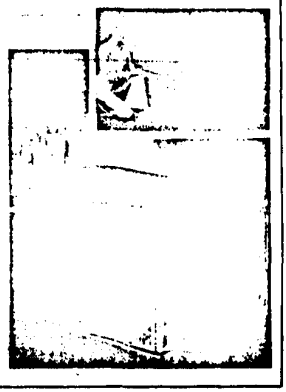
Syrup/water analyzer

Intended for use in the beverage industry, the Model SR meter checks the syrup/water ratio of sugar- and nonsugar-sweetened soft drinks. Measurements can be made in less than 3 min—including sample preparation—says the maker. Accuracy and repeatability are within 1%.

The instrument uses two built-in cells to compare the conductivity of a lab-prepared standard to that of a sample from the production line. Meter readout is in percent conformation, with 100% being equivalent to no deviation from the standard. Portable and powered by a 9-V battery, the instrument weighs less than 2 lb. The unit measures 6 × 4 × 5 in.—*Myron L Co., Encinitas, Calif.* 354

Containers go out full, come back flat

Suitable for handling most types of bulk or packaged materials, these 50-ft³, rectangular, metal containers can be knocked down to occupy minimum space during return shipment. The containers are made in two gages of aluminum: for one- and two-ton loads. Container tare weights are 131 lb and 170 lb, respectively. With plastic lids, the containers can be stacked two high; standard dimensions are 60 × 44¾ × 39½ in. A polyethylene bag, a rubber bladder, or some other material can be used as a liner, if so desired. Fourteen knocked-down empties are less than 8 ft high.—*Hoover Ball and Bearing Co., Tote Systems Div., Beatrice, Neb.* 353



Acrylic processing-aid

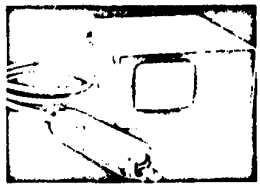
Now commercially available is Acryloid K-125, an acrylic processing aid for rigid vinyl compounds. Claimed to be at least 20% more efficient than conventional processing aids, the acrylic is said to produce no deleterious effects on the thermal stability and physical properties of vinyl compounds.

Suitable for use in the manufacture of vinyl pipe, sheet, film and injection-molded fittings, Acryloid K-125 is cleared for inclusion in semi-rigid and rigid vinyl food-packaging materials under FDA Regulations 21 CFR 121.2597.—*Rohm and Haas Co., Philadelphia, Pa.* 355

Programmable calculator

The HP 9830B programmable, desktop calculator is a more-powerful version of the firm's HP 9830A unit. Using a newly developed semiconductor memory, the calculator comes with 15,808 bytes of read/write memory and built-in string-variables and matrix-operation capability. The memory can be expanded to 30,144 bytes.

Featuring a built-in tape-cassette drive, the calculator operates in BASIC language and has an alphanumeric keyboard and display. Available peripherals include line printers, impact printer/plotters, plotters, paper-tape puncher and readers, digitizers and a 4.8-megabyte mass memory.—*Hewlett-Packard, Palo Alto, Calif.* 362



Television cameras

Three miniature cameras for closed-circuit television systems are now available for wet and dry inspection applications.

The Imlec V-150 System camera is 1¼ in. in dia. and incorporates a conventional vidicon tube that's recommended for inspecting flaws and minute cracks in dry, nonexplosive environments. Said to be unaffected by temperature or vibration, the system consists of a camera head, 100 ft

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