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Conversion of Laboratory Stock $CH_3{}^{203}HgCl$ to Inorganic ^{203}Hg

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Studies on the physiological and ecological effects of methylmercury have been extensive (FERENS 1974; ELDER & GAUFIN 1974; BURROWS AND KRENKEL 1973; CUNNINGHAM & TRIPP 1973). Many laboratory studies consist of exposing an organism to radioactive methylmercury and observing either bioaccumulation levels or effects upon a physiological process. Such studies often assume that the stock compound remains in the organic form as purchased. This note presents some data which suggests that $CH_3{}^{203}HgCl$ undergoes a chemical breakdown to the inorganic form in a relatively short period of time.

MATERIALS AND METHODS

Methylmercury-203 chloride was purchased from ICN of Irvine, California. The compound was shielded from light when stored. During the course of a previous study (MEDEIROS et al. 1980) the purchased stock solution was checked on 3 different occasions for percent methylmercury. Two hundred and fifty microcuries were shipped in 0.11 mL of 0.0005 M Na_2CO_3.

Paper chromatography was used to determine the percent methylmercury of the stock solution. Fifty microliters of a 10 ppb ^{203}Hg in the form of $CH_3{}^{203}HgCl$ in an aqueous solution was spotted on Whatman paper number 3. The solvent system contained 95% butanol, 28% ethanol, and aqueous ammonia in a ratio of 8:1:3 respectively. The solvent front was allowed to migrate 15 cm from the origin of the spots. The chromatogram was air dried under a fume hood and cut into 1 cm strips for each spot. Each strip of paper was added to 5 mL of counting cocktail (Beckman Co.). Activity was determined on a Hewitt-Packard scintillation counter (Model 3003). Freshly prepared standards of non-labelled $HgCl_2$ and CH_3HgCl (Sigma Chemical Co., St. Louis, Missouri) were prepared in the same concentration and spotted in a similar manner. For the standards, spot migrations were determined by spraying the chromatograms with a copper sulfate and potassium iodide-sodium sulphite solution as described by JOHNSON & VICKERS 1970. R_f values were calculated as the spot migration divided by the solvent front migration. The amount of mercury present as inorganic and methylmercury was expressed as a percent. This procedure was carried out on three separate occasions throughout a nine month period.

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RESULTS

Inorganic mercury remains at the chromatogram origin and methylmercury migrates with the solvent front according to standards used (Table 1). Day zero is the reference date supplied by ICN when the radionuclide activity was assayed. Percent $CH_3{}^{203}HgCl$ and ^{203}Hg was determined on days 12, 111, and 267 with respect to the reference date. These dates were chosen only as a matter of convenience and were done as a check on the system. Results show that by day 12, 61.5% of the total ^{203}Hg was in the form of methylmercury while 26.9% was in the form of inorganic mercury. Total amount of methylmercury was reduced to 16.4% by day 111 and was negligible by day 267. The amount of inorganic mercury rose to 83.6% and almost 100% by days 111 and 267 respectively.

TABLE 1

Percent ^{203}Hg present as Methylmercury and Inorganic Mercury

Day	Methylmercury	Inorganic Mercury
12	61.5	26.9
111	16.4	83.6
267	Negligible	99.9

DISCUSSION

Methylmercury-203 chloride appears to rapidly breakdown to inorganic mercury-203 within the 9 month period studied. The reasons for this observation remain to be explained. Possible bacterial contamination may account for this since they are known to play a major role in organomercurial cycling (JERNELOV 1972). The stability of non-labelled methylmercury in aqueous solution was not studied. Standard solutions were freshly prepared when used to minimize any possible breakdown of non-labelled methylmercury.

This observation should be studied further since many methylmercury studies appear to assume most of the purchased compound to be methylmercury when it may be inorganic mercury or a mixture of both compounds. Extraction of methylmercury from stock mercury preparations may be a necessary step in future mercury studies.

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