

CHAPTER V

CONCLUSION

The speciation of mercury compounds, inorganic, methyl, and phenylmercury, was studied. Mobile phase systems containing 2-mercaptoethanol-ion-pairing agents were developed as new mobile phase system in this study. The various parameters on the separations of mercury compounds were studied in order to optimise the chromatographic conditions. Moreover, the factors affecting the sensitivity of mercury compounds were studied. Two mobile phase systems in this study were developed from the typical mobile phase system. The addition of ion-pairing agents into the mobile phase containing the complexing agent were studied. The selectivity factor, capacity factor, and resolution of mercury compounds were effected from the mobile phase with mixed complexing agent and ion-pairing agent. The selectivity and separation of mercury compounds were improved with competition between the complexing agent and ion-pairing agent in the mobile phase. In the first system, good separation was achieved with low methanol concentration in a reasonable time.

In the first system, 12:88% v/v of methanol-water buffered with 1.00×10^{-3} M acetate-acetic acid buffer solution pH 3.00 containing 0.0075M tetrabutylammonium bromide and 0.0050% v/v 2-mercaptoethanol was the optimum mobile phase system. The flow rate of 1.50 mL/min was used for separation inorganic and methylmercury. The separation was achieved within 8.00 minutes. Inorganic mercury was eluted after methylmercury, thus the high concentration of inorganic mercury was not effected the peak of methylmercury. Mercury compounds give good linear range in this system. The calibration curves ranged from 1.00-20.00 ppm of mercury compounds give good sensitivity and linearity. The detection limits of both mercury compounds was the same at 0.30 ppm for injection volume of 50 μ L.

The mixture of methanol-water (40:60% v/v) buffered with 1.00×10^{-3} M acetate-acetic acid buffer solution pH 5.00 containing 0.0040M sodium hexanesulfonate and 0.0040% v/v 2-mercaptoethanol and the flow rate of 1.20 mL/min were the optimum conditions for the second system. Inorganic, methyl, and phenylmercury were successfully separated within 14.00 minutes. All mercury compounds give good linear range in this system. The calibration curves range from 1.00-20.00 ppm of mercury compounds give the good linear correlation and high sensitivity. The detection limit of mercury compounds for injection volume of 50 μ L were 0.80, 0.30, and 0.20 ppm for inorganic, methyl, and phenylmercury, respectively. The precision of both system were studied and gave acceptable results comparison with the AOAC[®] reference method.



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RECOMMENDATION

According to the above study, the author may suggest the recommendation for the speciation of mercury compounds as follows.

Since all mercury compounds are toxic and methylmercury compound is highly volatile, mercury compounds must be carefully handle. The waste containing mercury compounds should be treated by precipitation of mercury compounds with sodium sulfide.

Due to the financial limit, the AR grade methanol was used as mobile phase. Therefore, high noisy baseline signal and ghost peaks were found in the chromatographic system. If the HPLC grade methanol is used, resulting chromatograms would have been better.

For the further study, the author may suggest as follows.

In tetrabutylammonium bromide-2-mercaptoethanol system, the used of larger complexing agent instead of 2-mercaptoethanol can improve the separation of inorganic and methylmercury, and phenylmercury is also detected.

In sodium hexanesulfonate-2-mercaptoethanol system, the used of larger complexing agent and/or longer alkyl-chain of ion-pairing agent can improve the separation of mercury compounds.

The detection limit of the method could be improved if pre-concentration of mercury compounds prior to analyses are carried out.