EVAPORATION AND SUBLIMATION OF BORIC ACID: APPLICATION FOR BORON PURIFICATION FROM ORGANIC RICH SOLUTIONS

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We report in this study a series of experiments whose purpose is to test the long held idea of boron volatility when neutral to acidic solutions containing traces of boron are evaporated. Boron recoveries have been measured precisely by isotopic dilution and boron isotopic ratios have also been determined. Most of the evaporations have been conducted at 60-65 °C in a closed system apparatus especially designed in our laboratory. Under the experimental conditions described here, it is found that no loss of boric acid occurs when ±1 µg of B is evaporated in water, HCl, HF and aceton solutions. Conversely to the previous studies (e.g. Ishikawa T. and Nakamura, E., 1990), we do not call for the need of using mannitol to prevent B losses during the evaporation of acidic solutions. Contrastingly, important losses of boron are obtained for methanol, ethanol as well as in organic rich natural solutions. In presence of methanol and ethanol, a volatile methyl (ethyl) borate is likely to be formed.

Conversely to evaporation, we show that boron is highly volatile when the dried residues of evaporation are kept heated. This boron volatilization by sublimation can be moderated by the use of mannitol, but a slight increase of the temperature allows B volatilization. No B isotopic fractionation is associated with the sublimation of B.

This property of boron to sublimate is used to separate B from an organic matrix. A miniaturized sublimation apparatus (the so called “microsublimation”) constituting of a 5 ml Teflon beaker, is proposed. The 100 % boron recovery yields and the absence on B isotopic composition make this method suitable for extracting B from organic rich samples. The application to boron purification from river waters is presented in a companion paper (Lemarchand et al., 2000).