

THE EFFECT OF BOILING AND FILTERING ON THE CONCENTRATION OF DISINFECTION BY-PRODUCTS IN TAP WATER

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Background and aims: Disinfection by-products (DBPs) are ubiquitous contaminants in drinking tap water with potential to produce adverse health effects such as bladder cancer and adverse reproductive effects. Filtering and boiling tap water can lead to changes in the disinfection by-products levels and affect the exposure through ingestion.

Methods: Changes in the concentration of 4 Trihalomethanes (THM4), MX and bromate were tested when boiling and filtering high bromine-containing tap water from Barcelona. For filtering we used a pitcher-type filter and a household reverse osmosis filter. For boiling we used an electric kettle, a saucepan and a microwave. Samples were taken before and after each treatment to determine the change in the DBPs concentration. pH, conductivity and free and total chlorine were also measured. Trihalomethanes were measured in quadruplicate samples using gas chromatography/electron capture detection. MX was solid phase extracted from water samples, a volatile isopropyl derivative was formed and analysed by gas chromatography - high resolution mass spectrometry. Ion chromatography with suppressed conductivity detection was used for bromate.

Results: A high reduction of THM4 (reduction ranging from 97% to 48%) and MX (reduction ranging from 72% to 54%) was observed for all experiments. Bromine-containing trihalomethanes were most eliminated when filtering and chloroform when boiling water. Bromate was highly reduced with reverse osmosis but showed little effect in the other experiments.

Conclusions: These findings suggest that exposure to THM4 and MX through ingestion is reduced when using these household appliances while bromate reduction is device-dependent. This should be taken into account in exposure assessment of epidemiological studies.