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LETTER TO THE EDITOR

Laboratory Contamination Associated with Supercritical Fluid Extraction Operations

Recent developments of supercritical fluid extraction (SFE) bring convenience and efficiency to extractions in the laboratory. Scientists are overwhelmed by eye-catching advertising words such as 'environmentally friendly, non-toxic, and non-hazardous carbon dioxide', etc., without thinking of possible effects of the release of carbon dioxide to their laboratory atmosphere.

In association with the operation of SFE instrumentation, we have observed serious contamination of laboratory air caused by the decompression process of the SFE system. During our work with very low concentrations of organotin compounds (e.g. organotin in water, at the ng/litre level), we have frequently noticed mysterious contamination of reagent chemicals, and even distilled water, by tributyltin (TBT) and dibutyltin (DBT), which showed up in the blank. Reagents highly affinitive to tin and organotin, such as tropolone and solvents, are most affected. We finally come to realize that the contamination was from the carbon dioxide of the SFE operations released to the atmosphere. The SFE technique was used in extracting butyltin compounds from harbour sediment, which contained higher concentrations of butyltin compounds.

Large amounts of carbon dioxide, carrying untrapped analytes and other co-extracted chemicals, together with considerable amounts of added modifying agents, notably methanol and sometimes chelating agents, are released to the laboratory atmosphere during the venting steps immediately after the extraction. The degree of contamination can even be worse if the extracted compounds are volatile. The worst scenario is caused by decompression of the system for service when the restrictor is plugged up in the middle of an extraction. It is important that the release of carbon dioxide from SFE operations should be directed to a powerful fume cupboard, or, better still, discharged to an absorbing flask containing a scrubbing solution of 10% sodium hydroxide and then through an activated carbon tower before it is allowed into the atmosphere. As the discharge flow is fast, wide-bore tubing should be used to direct the flow to the absorbing flask and to the activated carbon tower.

Y. FANG AND Y. K. CHAU
National Water Research Institute,
Canada Centre for Inland Waters,
Burlington, Ontario, Canada L7R 4A6

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