**A new titanium dioxide solid phase for the determination of inorganic arsenic species**

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Arsenic is a naturally occurring element which is present in groundwaters in different areas around the world, including South Asia, America and to less extent different regions in Europe. In aqueous matrices, arsenic presents different oxidation states, As(V) and As(III), depending mainly on redox conditions. Arsenic speciation is also pH dependent and at near-neutral conditions of typical groundwaters As(III) exits as neutral species (H3AsO3), whereas As(V) exits as anionic species (H2AsO4- and HAsO42-). Organic arsenic species, notably dimethylarsinic acid (DMA) and monomethylarsonic acid (MMA) are introduced into the environment primarily through agricultural and industrial activities. Arsenic is considered as a pollutant since elevated levels of arsenic in drinking waters and/or long-term exposure have been associated with cancer of skin, lungs, urinary tract, kidney and liver (Bissen&Frimmel.2003). Therefore, the World Health Organization has set the guideline concentration for arsenic in drinking water at 10 µg L-1.

The low regulated level of arsenic and its complex chemistry represent a challenge from the analytical point of view. Very sensitive analytical techniques are required for arsenic determination and speciation. In this respect, one approach that has gained acceptation consists on the preconcentration of arsenic species using an appropprited adsorbent (Chen et al.2009). A further elution step is necessary prior to the measurement with atomic or molecular optical techniques. We have evaluated a commercial titanium dioxide solid (Adsorbsia As600) for the preconcentration of both inorganic As(V) and As(III) from well waters, without any previous pretreatment of the sample. In order to characterize the sorbent, batch experiments were undertaken for determining the capacity for As(III) and As(V), and a value of 0.2 mmol g-1 was measured in both cases. Elution of adsorbed species was only possible using basic solutions, and recoveries of 50% under batch conditions or 27% under flow conditions were obtained when 60 mg of loaded titanium dioxide were treated with a 0.5 NaOH solution. Then, different minicolumns were packed with Adsorbsia As600 to be used for calibration and for determination of arsenic in different samples. Good accuracy, precision and recoveries were obtained when spiked waters at 100-200 µg L-1 were analyzed. Similarly, the measured concentrations in water samples containing arsenic from Pyrinees (Catalonia, Spain) show good agreement with the ICP-MS results. Interestingly, the study of potential interferences has shown that this material is less sensitive to the major ions present in water than the traditional ion-exchangers.

References

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