Abstract

This work shows developing conductometric sensor based on molecularly imprinted polymer (MIP) for the screening of combinatorial mixture of haloacetic acids (HAAs) in drinking water. The recognition of the HAAs was achieved by trichloroacetic acid (TCAA)-imprinted polymers synthesised from the copolymerization of 4-vinylpyridine and ethylene glycol dimethacrylate in the presence of the TCAA template in acetonitrile, either by bulk polymerization (BP) method or by a multi-step swelling polymerization (MSP) method. TCAA-imprinted polymer of both methods was tested for re-binding with the template and its analogs. It was found that these polymers could bind selectively to the template molecule and HAA derivatives. HAA measurements were carried out by the application of the polyvinyl chloride membrane fabricated with TCAA-imprinted polymer on conductometric sensors. The technological factors (operating frequency, membrane composition, ionic strength and medium pH) for the sensors were identified and optimised in respect to the response to TCAA. The selectivity of the sensors was also investigated, which the influence of the method of imprinting on the binding strength and selectivity of the recognition element embedded in sensor was observed. The sensors showed high sensitivity and selectivity for the response toward TCAA, the sensor modified with MSP-based MIP being better. In addition, the sensors exhibited good cross-reactivities with a wide range of HAAs, which is useful for the screening of the group of HAA usually present in chlorinated water in combinatorial mixtures. Moreover, the results in real analysis of the sensor constructed with MSP-based MIP indicate the simplicity and reliability of the method. The present work proved that the sensor based on TCAA-imprinted polymer is a fast and sensitive screening method of HAAs in drinking water.