DETERMINATION OF MERCURY(II) IN SPRING WATER SAMPLES BY USING CENTRI-VOLTAMMETRIC METHOD

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Mercury and its compounds are highly toxic substances, which can be taken into the human body through respiratory, water and food. Mercury level in water is generally low. Voltammetric methods are also used for the determination of inorganic mercury in spring water samples as well as spectroscopic methods such as cold vapor atomic absorption spectrometry, atomic fluorescence, inductively coupled plasma atomic emission or optical emission spectroscopy (ICP-OES) [1, 2]. Low costly centri-voltammetric methods have been developed for ultratrace inorganic mercury analysis. Preconcentration stage of these methods, the accumulation of analyte on electrode surface is provided by centrifugal process, became different from anodic stripping voltammetry [3, 4].

In this study, determination of mercury(II) ions in two different spring water samples, which were taken from around the Ambaraseki and Saip villages in Karaburun İzmir in where old mercury mine was located, were carried out with centri-voltammetric method by using Purolite C-100 cation exchange resin as a carrier material. Preconcentrated mercury(II) ions on resin were carried on glassy carbon electrode via centrifugation by using a special designed cell for centrifugation and voltammetric measurement. Then, potential was scanned from -1000 mV to 800 mV vs. Ag/AgCl with a rate of 10 mV s\(^{-1}\) in differential-pulse mode in the same cell containing of 0.5 M perchloric acid. The peak currents related to the mercury ions were recorded.

The sensitivity of this method was very high under the optimized voltammetric and centrifugation conditions. For this reason, the effect of interferences in sample matrix was able to eliminate by diluting of sample without any pre-treatment. The mercury(II) content of the same water samples were also determined using ICP-OES equipped with hydride kit and the results are given with the centri-voltammetric results in table below.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Obtained Hg(II) concentration (M)</th>
<th>The difference between two methods</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Centri-Voltammetric Method</td>
<td>ICP-OES Method</td>
<td></td>
</tr>
<tr>
<td>SW I</td>
<td>5.42 ×10(^{-9})</td>
<td>4.87 ×10(^{-9})</td>
<td>5.5 ×10(^{-10})</td>
</tr>
<tr>
<td>SW II</td>
<td>1.92 ×10(^{-8})</td>
<td>1.88 ×10(^{-8})</td>
<td>4.0 ×10(^{-10})</td>
</tr>
</tbody>
</table>

References