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Determination of ultra-trace Pt, Pd and Rh in seawater using an off-line pre-concentration method and inductively coupled plasma mass spectrometry

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1           **Determination of ultra-trace Pt, Pd and Rh in seawater using an off-line**  
2           **pre-concentration method and inductively coupled plasma mass spectrometry**

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13           Abstract: A method was modified for the preconcentration of platinum (Pt), palladium (Pd) and rhodium  
14           (Rh) from seawater by a solid phase extraction using a commercially available resin Nobias-chelate PA1<sup>®</sup>.  
15           All the determination was conducted using inductively coupled plasma mass spectrometry (ICP-MS) which  
16           had a low detection limit for Pt, Pd and Rh, about 16.53, 16.41 and 26.88 pg L<sup>-1</sup>, respectively. It was found  
17           that the adsorption performance of the resin was closely related to the matrix, ligands and pH of the  
18           samples. Significant difference in recovery was found in various samples: seawater ≈ artificial seawater >  
19           ultra-pure deionized water. This method had low method blank in the range of 5.51 to 8.89 pg L<sup>-1</sup> and high  
20           enrichment factor of up to 180~200. The recoveries of Pt and Pd were 93 ± 4.2% in the spiked real seawater.  
21           However, the recovery of Rh on the resin was below 70% but stable in the range of 65-68%. It indicated  
22           that the Rh recovery seemed to be reproducible and higher volumes of seawater must be processed in order  
23           to obtain the lower limit of quantification and excellent recovery.

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25           Keywords: Platinum group elements; Seawater; ICP-MS; Pre-concentration; Chelating resin

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