Analysis of Technetium Species and Fractions in Natural Seaweed Using Biochemical Separation and ICP-MS Measurement

An extremely high accumulation and retention of technetium in marine plants, especially brown seaweed, makes it a unique bioindicator of technetium. In the present work, a novel approach was developed for the speciation analysis of technetium in seaweed, wherein a series of biochemical separations was exploited to isolate different species of technetium. Inductively coupled plasma mass spectrometry (ICP-MS) was applied for the measurement of $^{99}$Tc after thorough radiochemical preconcentration and purification. The results show that the distribution of technetium species in seaweed is relatively dispersive. Besides the inorganic species of $\text{TcO}_4^-$, most of technetium (>75%) combined with organic components of seaweed such as algin, cellulose, and pigment. This investigation could provide important fundamental knowledge for studying the processes and mechanisms of $^{99}$Tc accumulation in the natural seaweed.

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