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Perchlorate Isotope Forensics

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Abstract:

Perchlorate has been detected recently in a variety of soils, waters, plants, and food products at levels that may be detrimental to human health. These discoveries have generated considerable interest in perchlorate source identification. In this study, comprehensive stable isotope analyses ($^{37}Cl/^{35}Cl$ and $^{18}O/^{17}O/^{16}O$) of perchlorate from known synthetic and natural sources reveal systematic differences in isotopic characteristics that are related to the formation mechanisms. In addition, isotopic analyses of perchlorate extracted from groundwater and surface water demonstrate the feasibility of identifying perchlorate sources in contaminated environments on the basis of this technique. Both natural and synthetic sources of perchlorate have been identified in water samples from some perchlorate occurrences in the United States by the isotopic method.

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