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(54) Title: SPECIATED ISOTOPE DILUTION MASS SPECTROMETRY OF REACTIVE SPECIES AND RELATED METHODS (57) Abstract A method of speciated isotope dilution mass spectrometry (SIDMS) which will permit determination of concentrations of one or more species from a sample even if the sample has been subjected to species conversion prior to species separation or degradation or incomplete separation exists. At least one predetermined stable isotope is spiked to convert the stable isotope to a speciated enriched isotope corresponding to the specie or species to be measured in the sample. The sample containing the species to be measured is spiked and the isotopic spiked specie and species to be measured are equilibrated. The species are separated from the sample and an isotope ratio determination for each specie to be measured is made. The species concentrations are then mathematically deconvoluted while correcting for species conversion and/or incomplete separation. The method may be employed to validate other methods. The method may also be employed in the preparation and analysis of speciated standard reference materials. The method may be employed in quantifying Cr(III) and Cr(VI).		