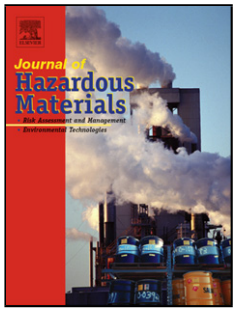

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Comparison of the spectroscopic speciation and chemical fractionation of chromium in contaminated paddy soils

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Highlights

- A positive correlation existed between Cr fractionation and Cr XANES speciation.
- Pure Cr precipitates was barely extracted by the Tessier's reductants.
- Dissolution of pure Cr precipitates caused the overestimation in the oxidizable Cr.
- XANES technique improves the reliability of chemical Cr fractionation.

ABSTRACT

Sequential extraction has been widely used to classify metal species in soils and sediments; however, the lack of selectivity in extraction reagents may lead to the misinterpretation of metal speciation. In this study, we used X-ray absorption near edge structure (XANES) spectroscopy to classify Cr species based on its molecular form. These results complement the conventional Cr fractionation derived from the Tessier extraction method. The linear combination fitting (LCF) for the Cr-XANES spectra indicated that the Cr species in the soils could generally be described as Cr(III) sorbed on ferrihydrite (Cr-FH), Cr(III) complexed with humic acid (Cr-HA), and precipitated Cr. While the sum of the adsorbed Cr(III) and Cr(III)/Fe coprecipitates showed a nearly 1:1 relationship with