

## **Arsenic speciation in bituminous coal fly ash and transformations in response to redox conditions**

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The continued use of coal-fired electricity generation and the risk of the mobilization of coal ash into the environment have highlighted the need for understanding the behavior of coal ash in the environment. In this study, we examined arsenic (As) speciation in two fly ash samples derived from bituminous coal, as well as transformations in As speciation in response to aquatic redox conditions. X-ray absorption spectroscopy indicated that major As-bearing hosts in un-amended fly ash samples were glass, iron oxyhydroxides, and calcium arsenate. Fly ash leaching under oxic conditions resulted in immediate As mobilization to the dissolved phase, re-precipitation of As-iron ferrihydrite, and As adsorption to surfaces. Under anoxic conditions, the (reductive) dissolution of As-bearing phases such as iron ferrihydrite resulted in increased dissolved As compared to oxic conditions, and re-precipitation of amorphous iron arsenate. Overall, As in coal fly ash is immediately mobilized into solution, and becomes largely associated with iron mineral phases. Arsenic in coal ash is not environmentally stable and results in increased dissolved and solid phase As loading to aquatic systems exposed to the ash.