

# Impact of Metal Ion Complexation on the Radiation Chemistry of Acetohydroxamic Acid in Aqueous Solutions

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Nuclear energy is a low carbon, high power density solution to increasing energy demands globally. However, a requirement for ensuring that the nuclear fuel cycle remains sustainable is the reprocessing of Used Nuclear Fuel (UNF) to extract uranium from UNF for reuse as fuel in nuclear power stations.

Acetohydroxamic Acid (AHA) is proposed for use as a more efficient and safer reductant in the separation of plutonium and neptunium from uranium during the reprocessing of UNF when compared to hydrazine-stabilised reductants [1]. The aggressive conditions found during UNF reprocessing (concentrated aqueous nitric acid, mixed radiation fields) have been found to promote hydrolytic and radiolytic degradation of AHA, affecting the lifetime and efficiency of AHA during separations [2-5]. The hydrolytic behaviour and radiation chemistry of AHA has been widely researched, however the radiation chemistry of AHA-metal complexes is still not yet fully understood [3-5].

This presentation will examine the radiation chemistry of AHA-Fe(III) complexes under both steady state gamma irradiation and time-resolved electron pulse irradiations in a range of aqueous solutions chosen for their relevance to nuclear reprocessing (water, nitrate, and perchloric & nitric acid). Experimental results have been incorporated into current multiscale computer models [6, 7] to better understand and predict the behavior of AHA under UNF reprocessing conditions.

## References

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