

PREDIS

Methods for the destruction of oxalic acid as a secondary wasteform

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Introduction

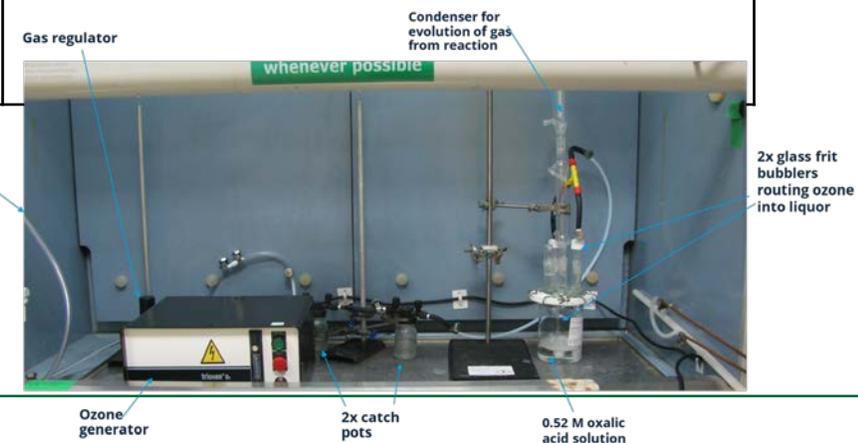
- Decontamination and volume reduction of metallic waste is possible during nuclear decommissioning operations.
- Decontamination options include laser ablation, gels, foams and chemical reagents.
- Management of secondary waste is key to successful decontamination.
- Oxalic acid is one chemical reagent which is being considered for POCO of the Sellafield plants, UK
- However, it is essential to understand how oxalic acid could be destroyed for the safety and efficiency of downstream plant operations



Sellafield Site, UK

Destruction of 250 ml of 0.52 M oxalic acid

Heating with nitric acid	Photocatalysis	Ozonation
<p>Experiments run at 50°C, 75°C and 100°C</p> <p>Manganese nitrate (0.00025 M – 0.05 M) added as catalyst</p> <p>Quicker destruction at higher temperature and Mn concentration</p>	<p>Photo-Fenton reaction via use of Fe^{2+}, H_2O_2 and UV conditions (365 nm)</p> <p>Periodic dosing with H_2O_2 to ensure maintenance of the reaction required</p> <p>Quicker destruction with UV, Fe^{2+} and higher H_2O_2 concentration</p>	<p>Ozone produced at 2 g/hr and 4 g/hr</p> <p>A small amount of degradation observed at 4 g/hr, with no change in oxalic acid concentration at 2 g/hr ozone</p>



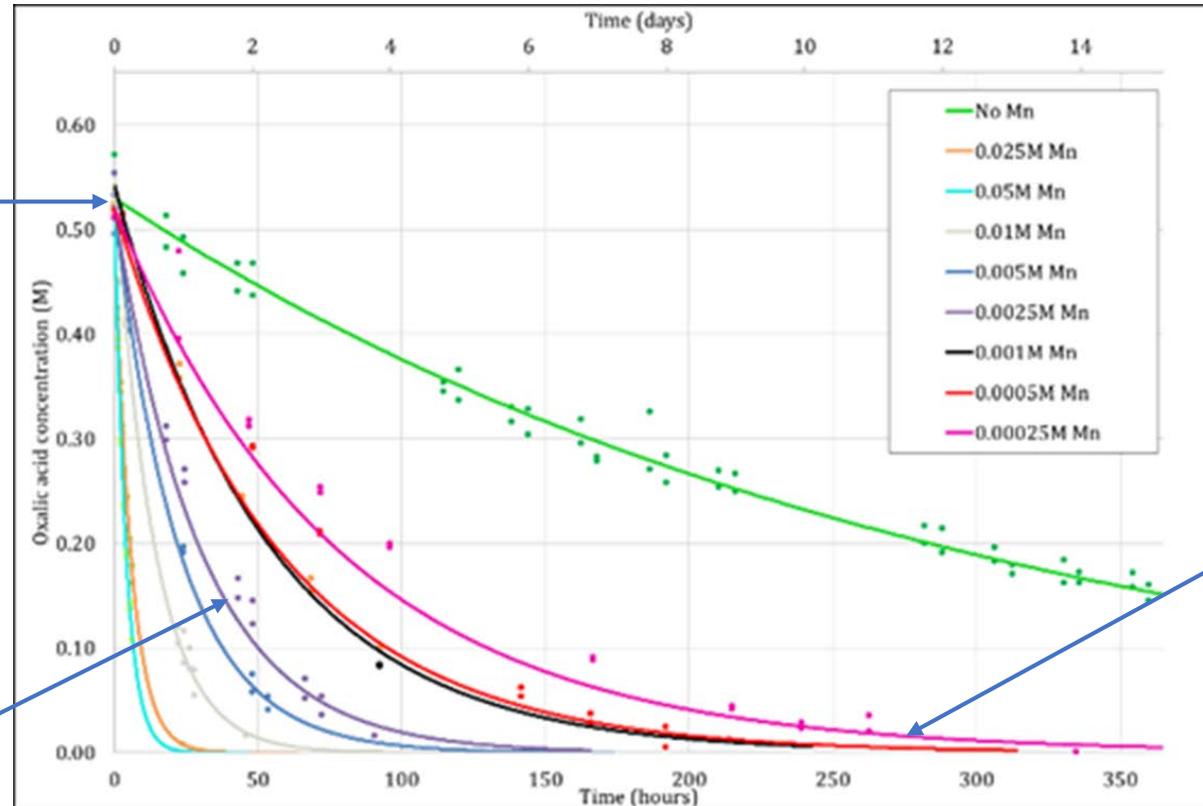
Heating with nitric acid



Reaction just started



Reaction well established



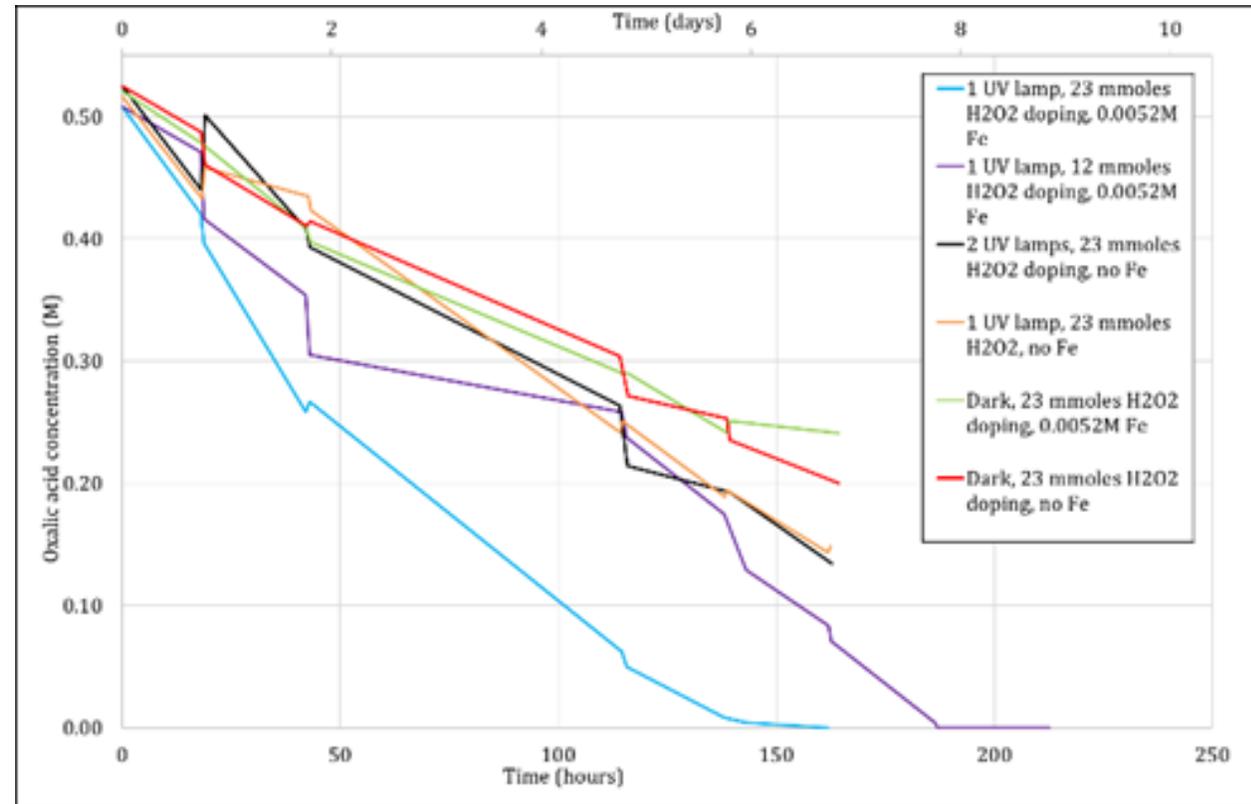
Destruction by heating with nitric acid at 75°C as a function of time



Reaction finished

Photocatalysis

- Destruction possible with only addition of H_2O_2 , but catalysed with the addition of UV light and Fe



Destruction by photocatalysis as a function of time

Summary

- Three oxalic acid destruction techniques were investigated:
 1. *Heating with nitric acid*
 2. *Photocatalysis*
 3. *Ozonation*

- The efficiency of the destruction using these techniques can be improved via the use of catalysts

- The limited experiments performed using ozonation were not optimised to reasonably assess the effectiveness of this method

Thank you



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