

Use of Oxidants to Improve Contaminant Remediation

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Project Team

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Oxidative Treatment Technologies

- **Motivation**

- Recalcitrant polar contaminants (e.g., NDMA)
- Hydrophobic contaminants (e.g., PCBs)
- Passive treatment (e.g., As in groundwater)

Oxidative Treatment Technologies

- **Motivation**

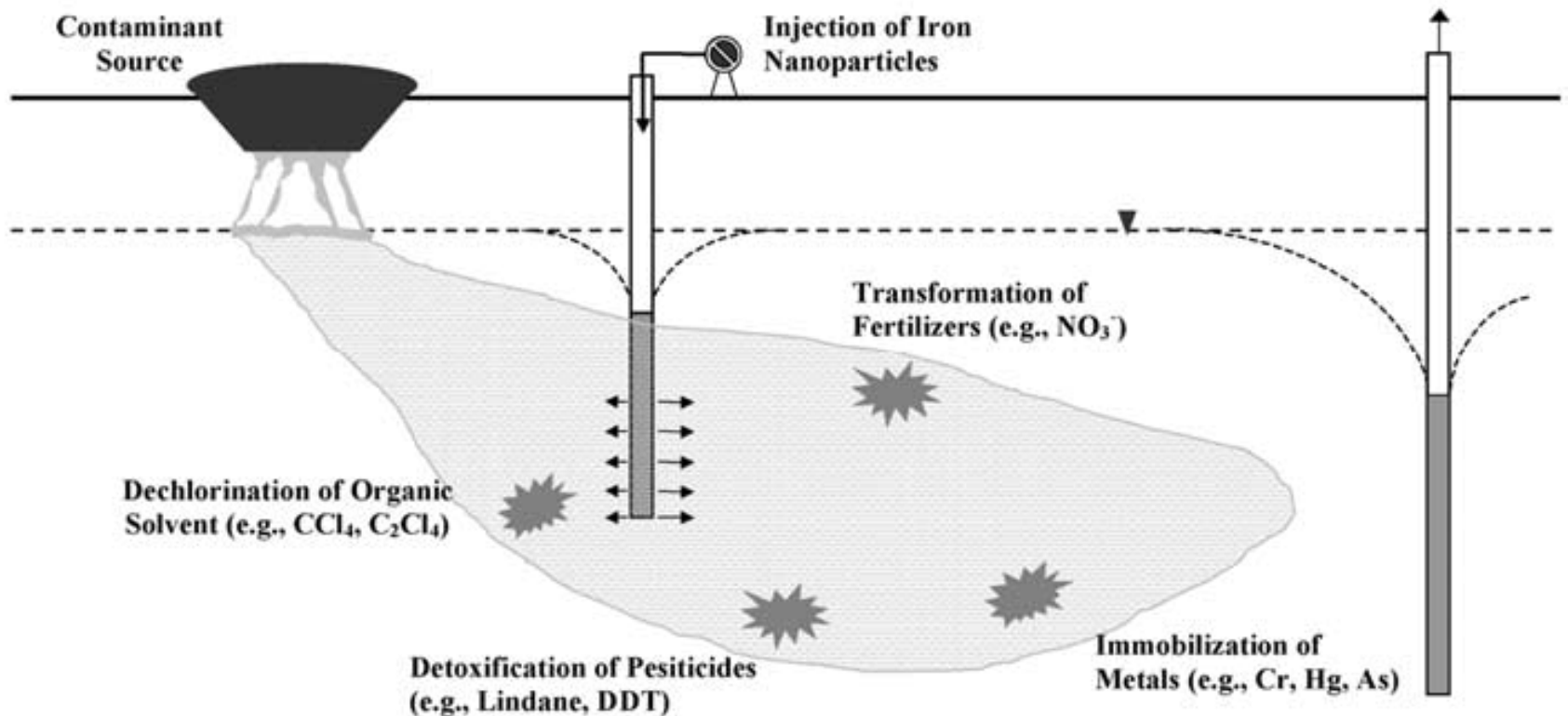
- Recalcitrant polar contaminants (e.g., NDMA)
- Hydrophobic contaminants (e.g., PCBs)
- Passive treatment (e.g., As in groundwater)

- **Limitations**

- Requires unstable reagents (e.g., H_2O_2)
- Hydroxyl radical is unselective

Fe Nanoparticles as Reductants

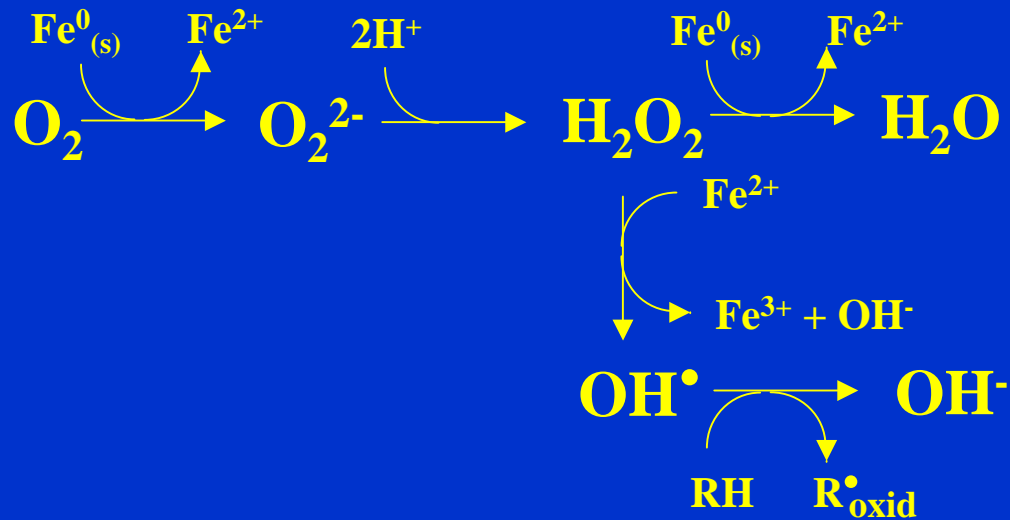
- Currently used for contaminant reduction



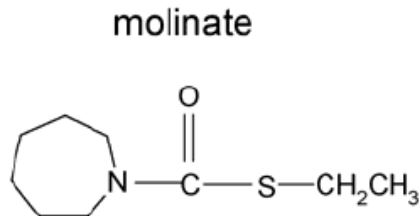
Zhang (2003)

Fe Nanoparticles as Oxidants

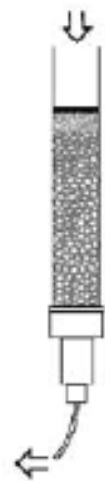
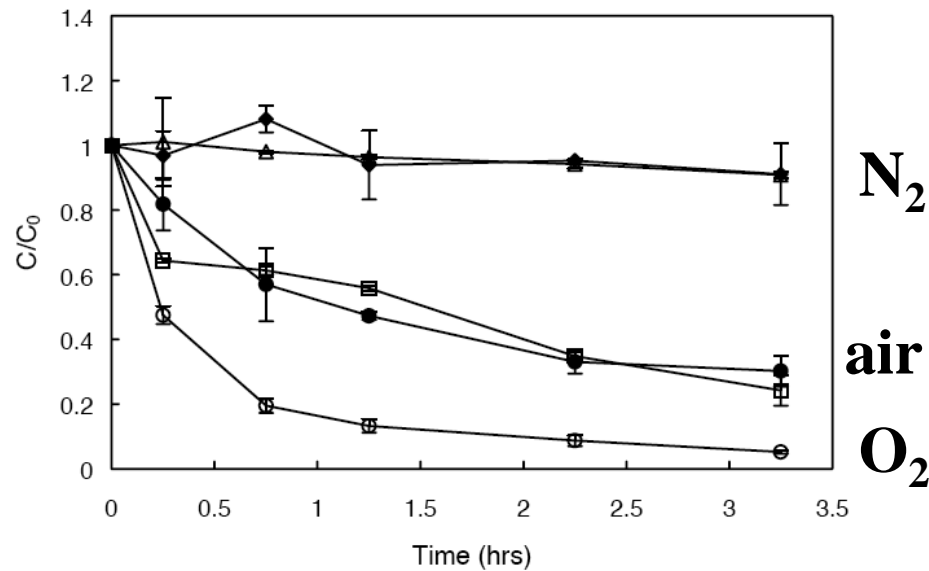
- Oxygen activation during Fe corrosion



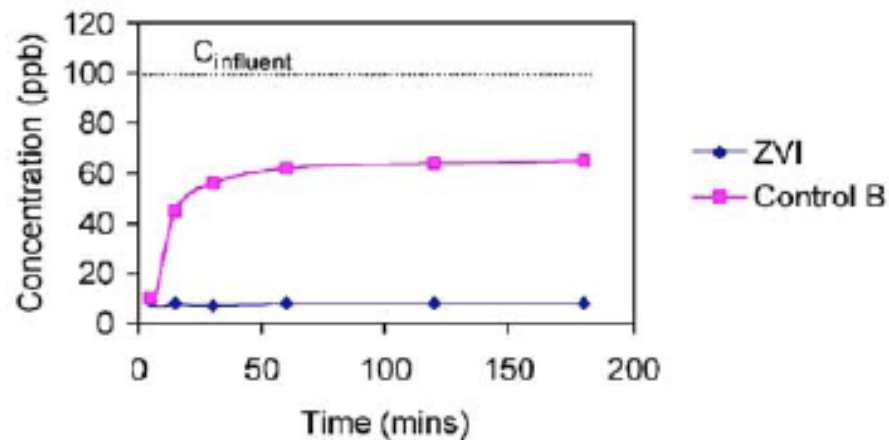
Oxidation of Molinate by Fe Nanoparticles



Joo et al. (2004)

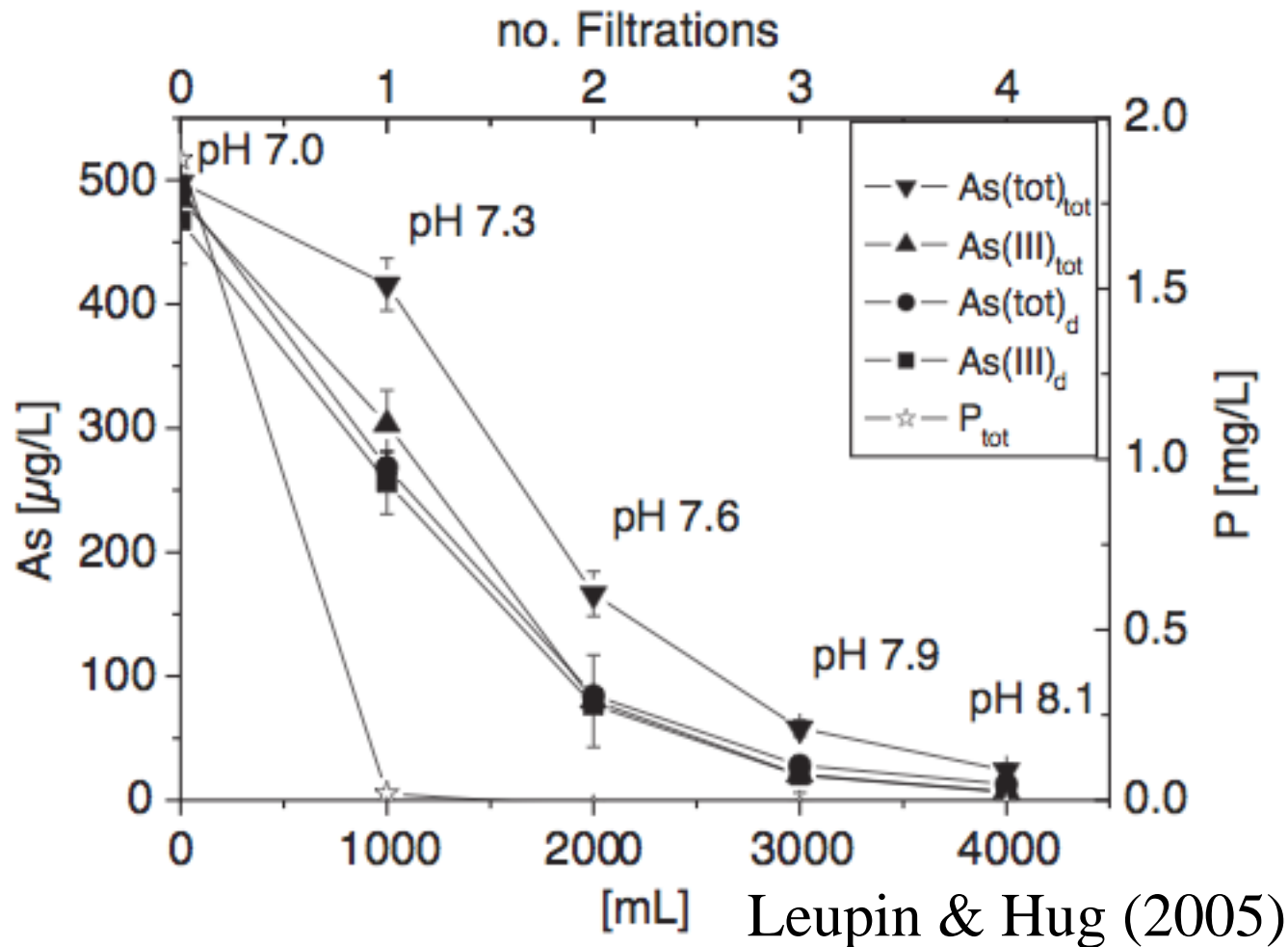


ZVI on sand/gravel



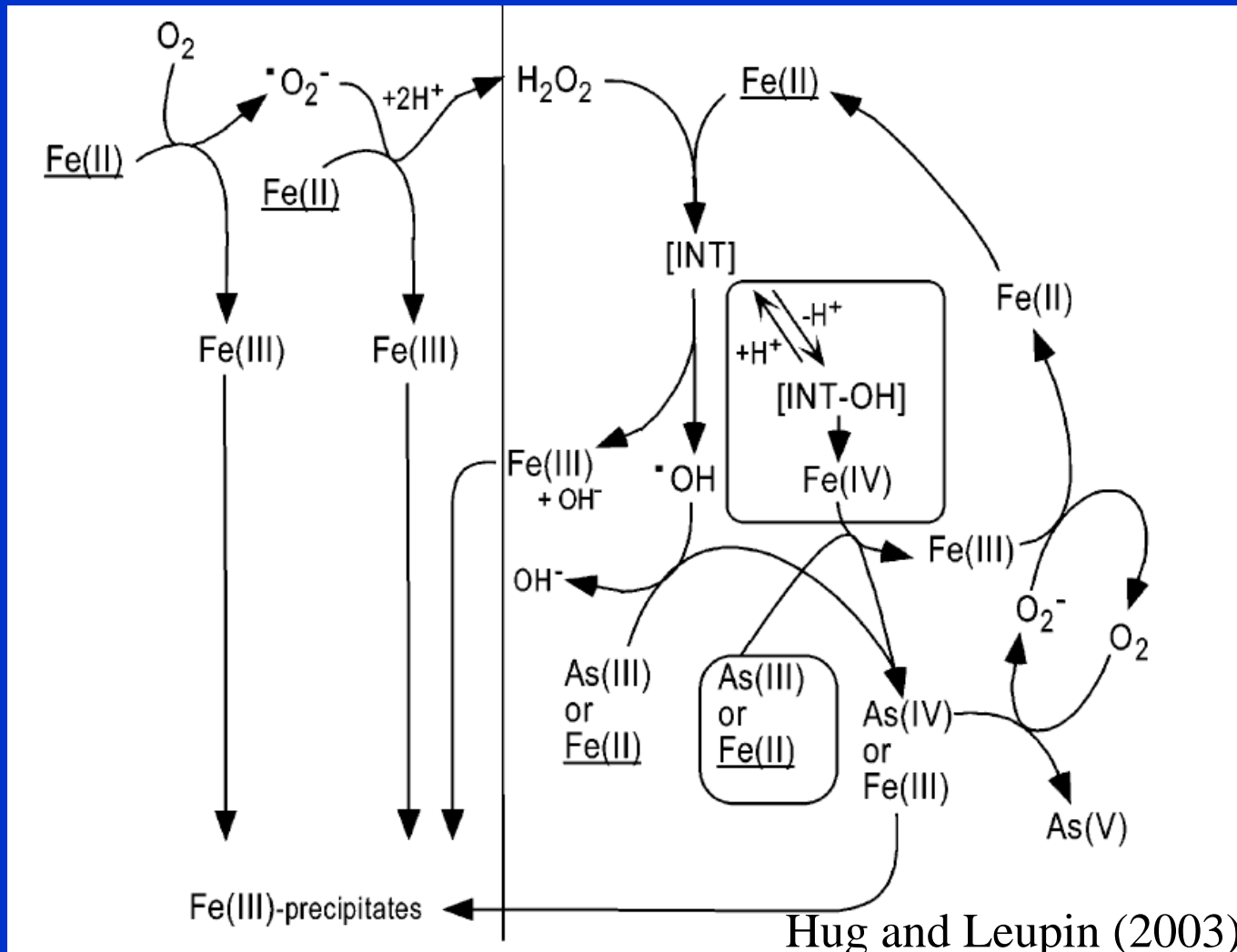
Oxidation of As(III) by Fe

- As(III) oxidation and As(V) adsorption



Oxidation of As(III) by Fe

- **Selective As(III) oxidation**



Oxidative Remediation with Iron

- **Fe can convert O_2 into a powerful oxidant**
- **Potential for selective oxidation on surface**
- **Potential applications**
 - **Passive treatment barriers**
 - **Soil and groundwater treatment**
 - **Drinking water treatment**