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Ferric-enhanced chemical remediation of dredged marine sediment contaminated by metals and petroleum hydrocarbons

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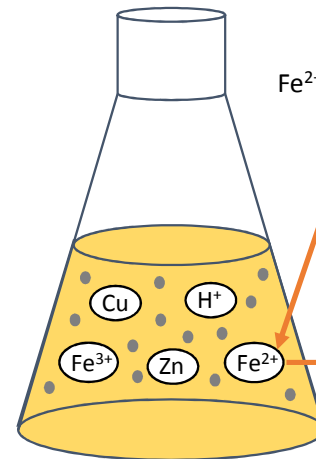
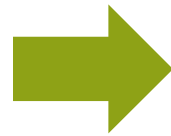
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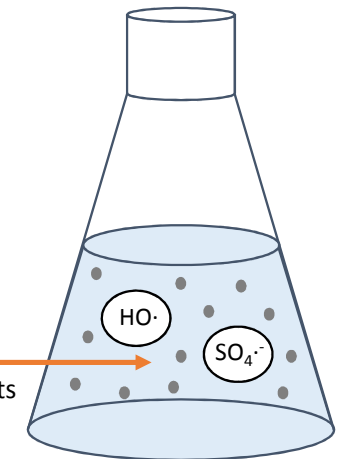
### Dredged marine sediment

- Fine particles
- Carbonates
- Heavy metals (Cu and Zn)
- Metal-organic matters (Me-OM)
- Metal-sulfides (MeS)
- Petroleum (TPH)

### Chemical treatment



$\text{Fe}^{2+}$  production by redox reaction between  $\text{Fe}^{3+}$  and  $\text{S}^{2-}$



$\text{Fe}^{2+}$ ; a catalyst to activate oxidants

### Chemical extraction

- Ferric chloride ( $\text{FeCl}_3$ )
- Acid-enhanced extraction
- Oxidative dissolution of sulfides
- Ion exchange OM with ferric

### Chemical oxidation

- Oxidants
- Persulfate ( $\text{S}_2\text{O}_8^{2-}$ )
- Hydrogen peroxide ( $\text{H}_2\text{O}_2$ )

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