Time-Release Electron Donor Technology for the Accelerated Bioremediation of Perchlorates

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REGENESIS Bioremediation Products

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Hydrogen Release Compound, HRC™

- HRC is a polylactate ester
- When hydrated, HRC time-releases lactic acid
- HRC accelerates anaerobic bioremediation of PCE, TCE, and TCA.
- HRC can reduce perchlorates, nitrate, Cr(VI)
  - Microbes metabolize lactic acid to other organic acid intermediates, such as acetic acid
  - **Hydrogen** is released as a by-product
  - This hydrogen serves as the electron donor

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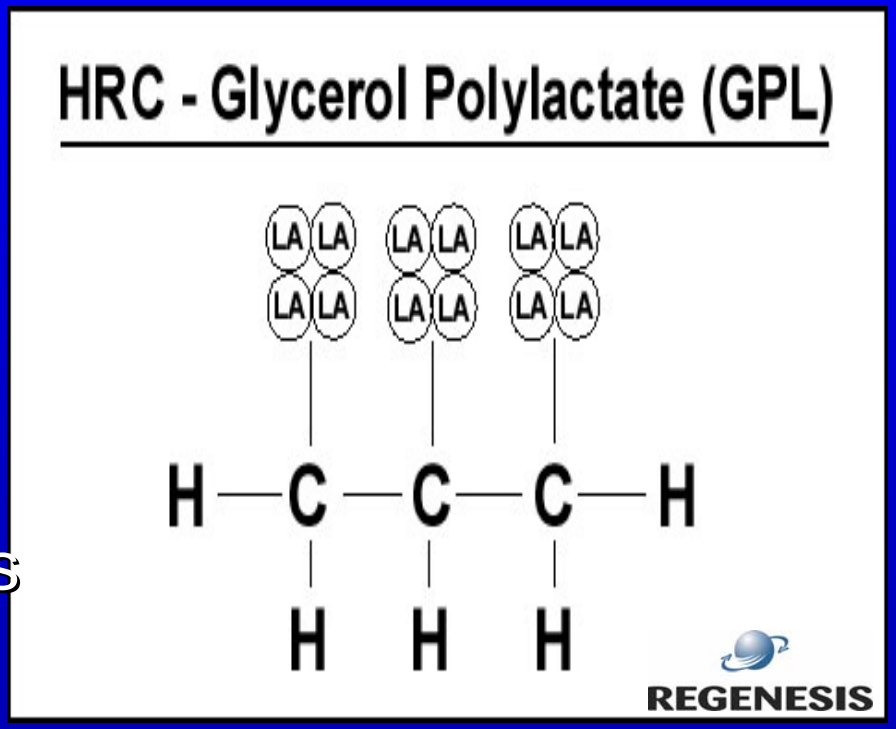
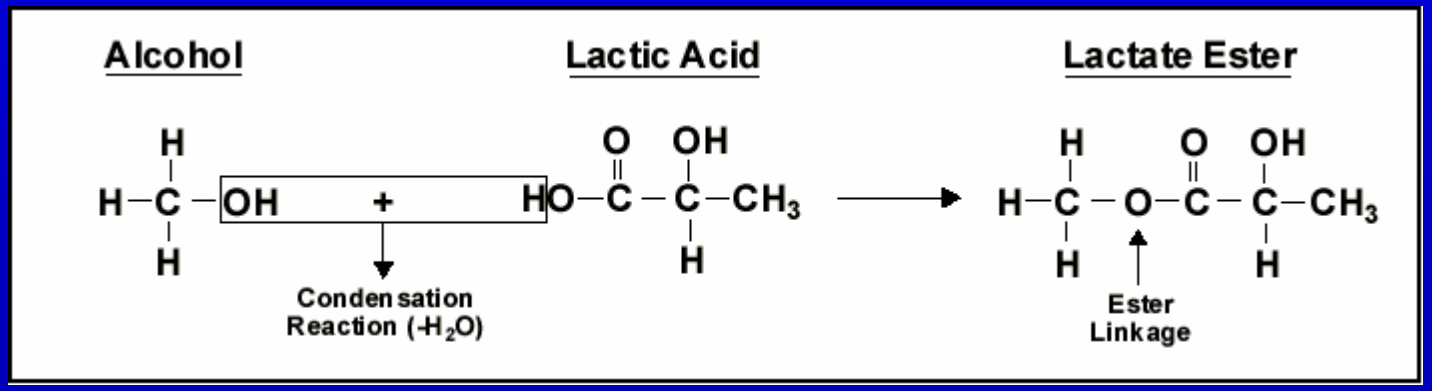
HRC Polylactate Ester Structure
Patented Time-Release Formula

- HRC is based on a three-carbon glycerol polylactate ester structure:
- HRC releases lactic acid for up to one year
- By providing a long-lasting, time-released hydrogen source, HRC cost-effectively accelerates anaerobic bioremediation



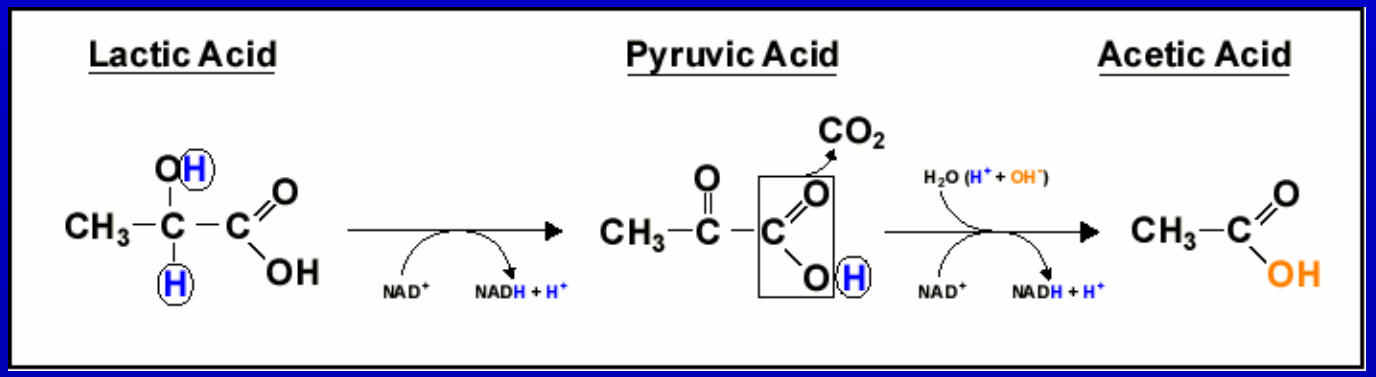
HRC Polylactate Ester Structure

- Polylactate esters are formed by linkages between lactic acid complexes and and a core molecule that contains alcohol groups
- A condensation reaction forms the ester linkage:

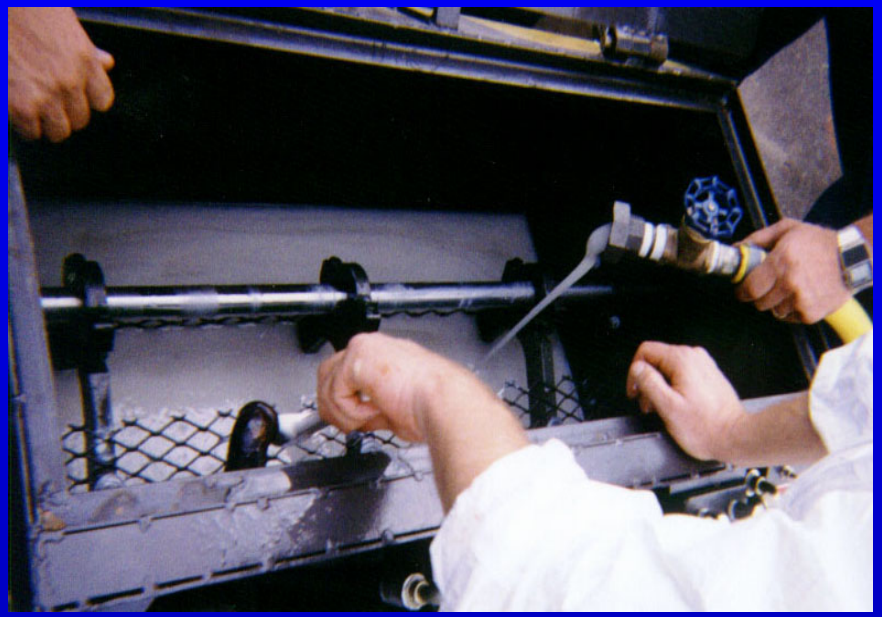


Using HRC to Promote Anaerobic Bioremediation of Perchlorates

- HRC, once deposited into the subsurface, slowly releases lactic acid.
- Anaerobic bacteria metabolize the lactic acid as a nutrient source.
- Hydrogen is released as a byproduct and can be used to enhance anaerobic bioremediation.



HRC Field Application



HRC is a viscous but injectable substance.

HRC is injected into the aquifer using direct-push technologies.

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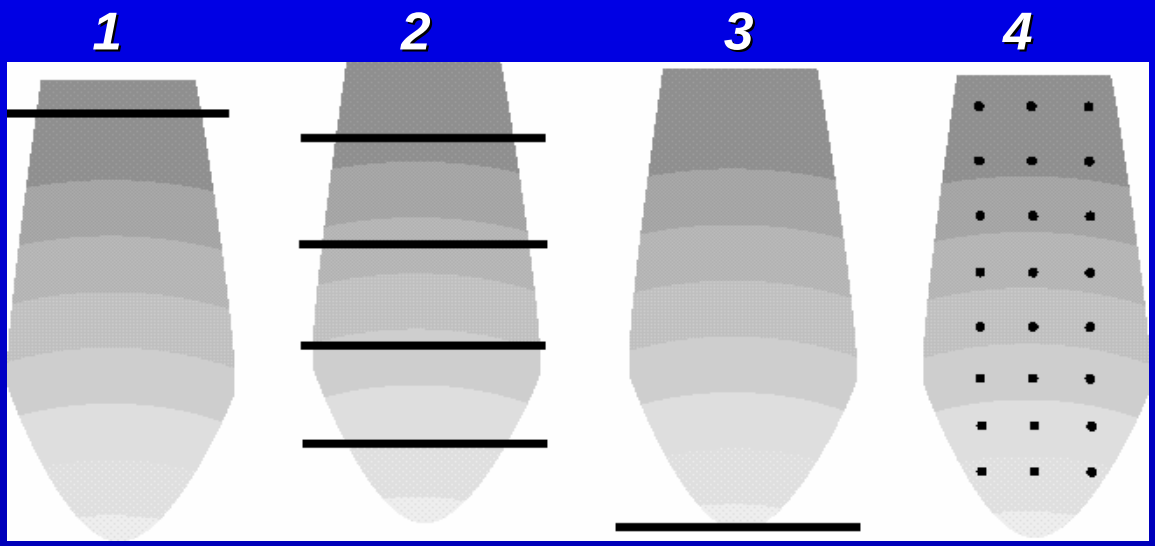
HRC Application

- Delivery Systems - bore-hole backfill or injection via direct-push technologies
- Designs for Barriers and Source Treatment
  1. Upgradient Barrier
  2. Series of Barriers
  3. Downgradient Barrier
  4. “Grid” of HRC injection points



The Benefits of a Persistent, Time-Release Hydrogen Source

- Allows for **passive** remediation
- **Cost-Effective**
  - **Reduces** capital **costs** in comparison with other technologies
  - Remains in place for continuous hydrogen delivery, for continued savings on O&M costs
- Non-invasive, leaves no above-ground disturbance
- Eliminates oxygen introduction which can occur with repeated fluid application using mechanical methods
- May favor reductive dechlorination over possible competing methanogenic activity

For More Information

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