Carbon Dioxide Capture and Biocompatible Sequestration in Aquatic Environments through Monoethanolamine Scrubbing within Calcium Alginate Gel

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BACKGROUND:

Alginate is a biopolymer extracted from the cell walls of algae and can cross-link with divalent cations to form an insoluble hydrogel. We suspended monoethanolamine (an amine scrubber) within the gel to test its carbon dioxide capture and storage capabilities.

METHODS:

1. Dry ice sublimation through bead mixture measured over mass balance to quantify CO_2 mass accumulation in gel.
2. UV-Vis Spectroscopy used to measure rate of dye leakage through core layer of varying alginate concentration and multilayered beads.
3. UV-Vis Spectroscopy used to compare leakage rates between Atlantic seawater-prepared beads and distilled water-prepared beads.

RESULTS:

- 85% CO_2 capture (validated using 2:1 stoichiometric ratio)
- Multilayering and increased alginate concentration delays outward dye diffusion.
- Beads prepared in solvents isotonic to their target aquatic environments resist degradation.

Biocompatible, multilayered calcium alginate hydrogel entraps amine CO_2 scrubber **monoethanolamine**, providing a potential mode of ecologically safe **carbon dioxide capture and storage** within aquatic systems.

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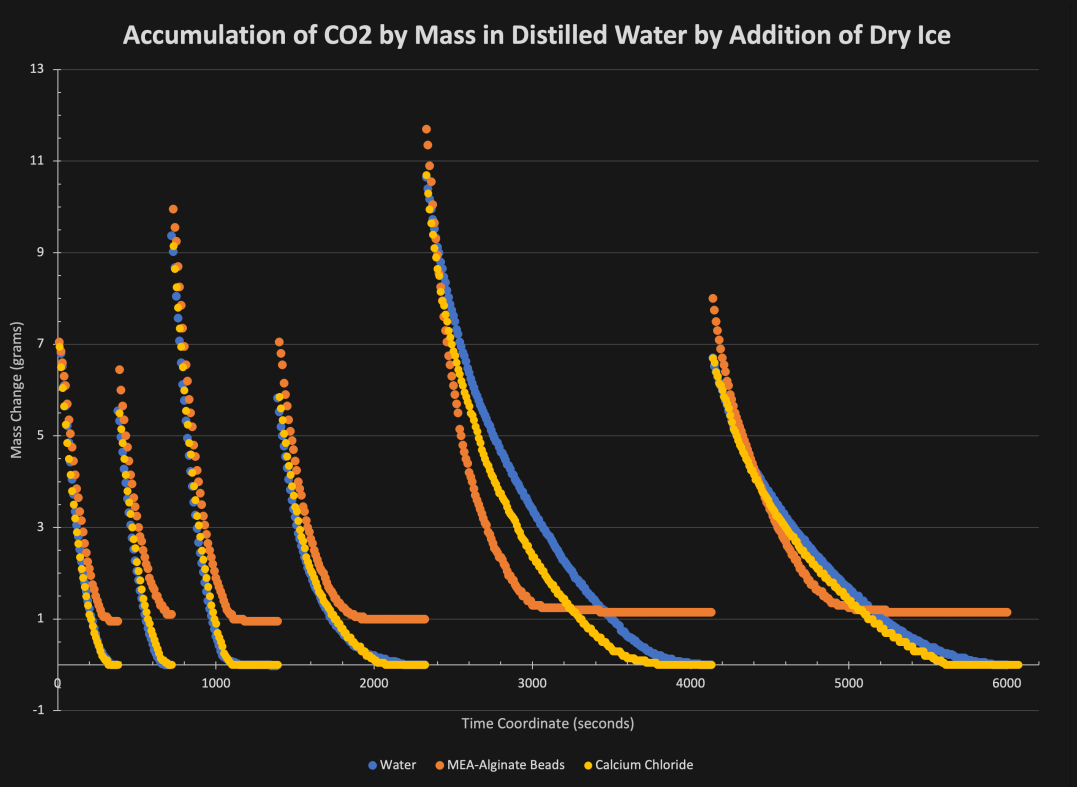

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SUPPLEMENTARY FIGURES:

Diffusion spectra (2%M, 2%T, 4%M, 4%T)