

Engineering synergistic co-cultures of *Clostridium autoethanogenum* and *Rhodospirillum rubrum* for production of polyhydroxyalkanoates

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Research question: Can *C. autoethanogenum* and *R. rubrum* work together in co-culture to increase production of polyhydroxybutyrate (PHB)?

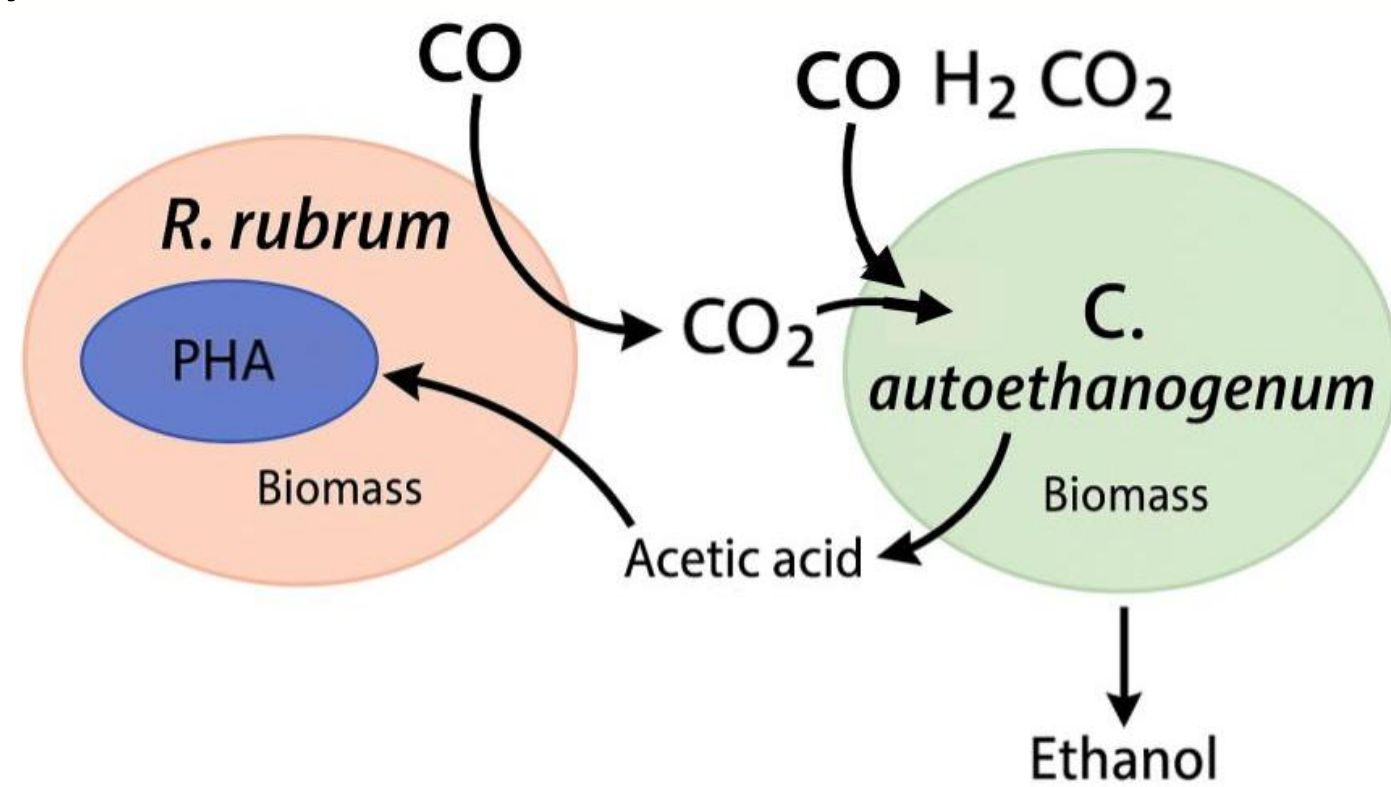


Figure 1: Metabolic synergy diagram

Introduction: *C. autoethanogenum* is known to produce acetate, a compound that is essential to the production of PHB by *R. rubrum*. PHB is a biopolymer that can be used as a component in bioplastics.

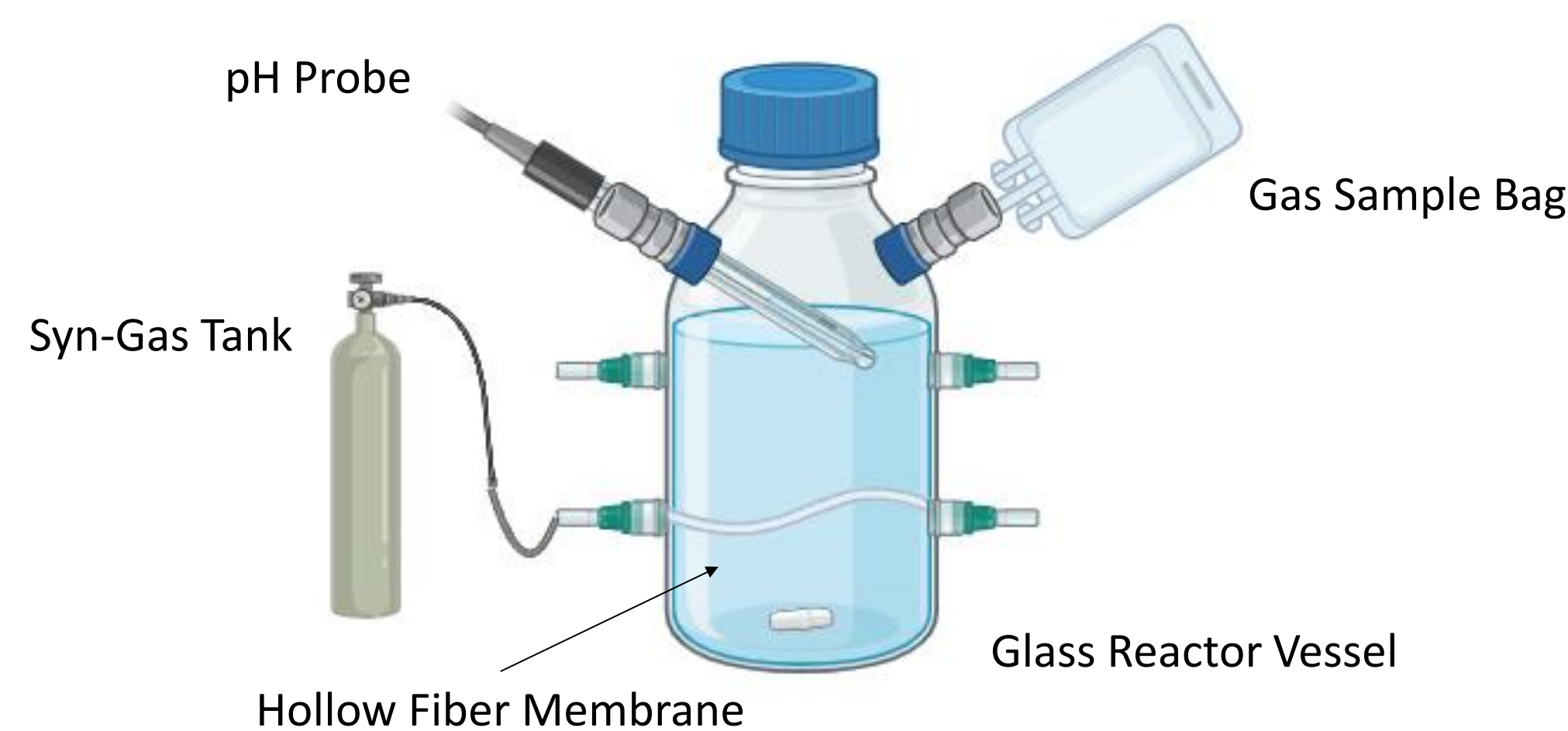
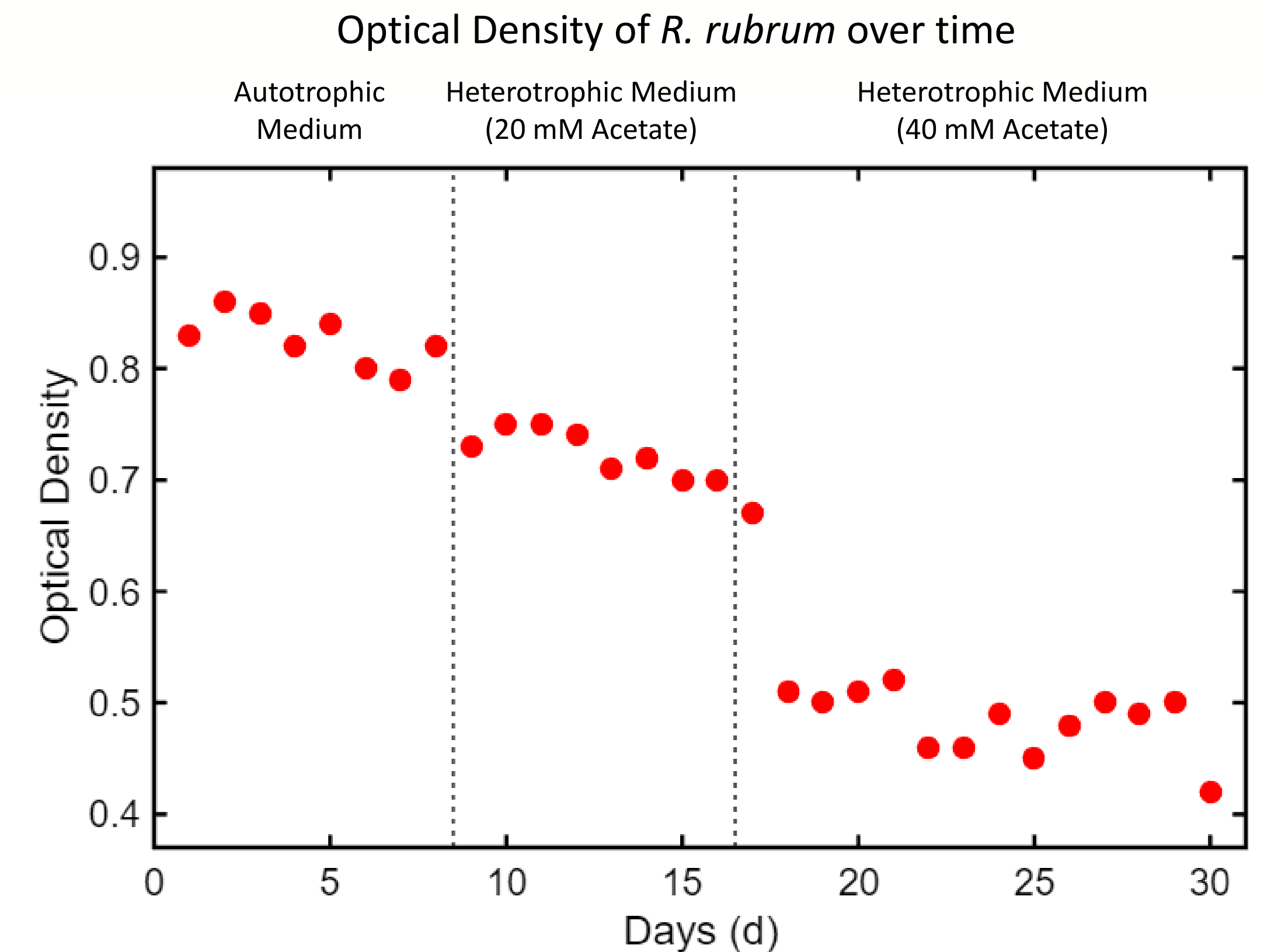
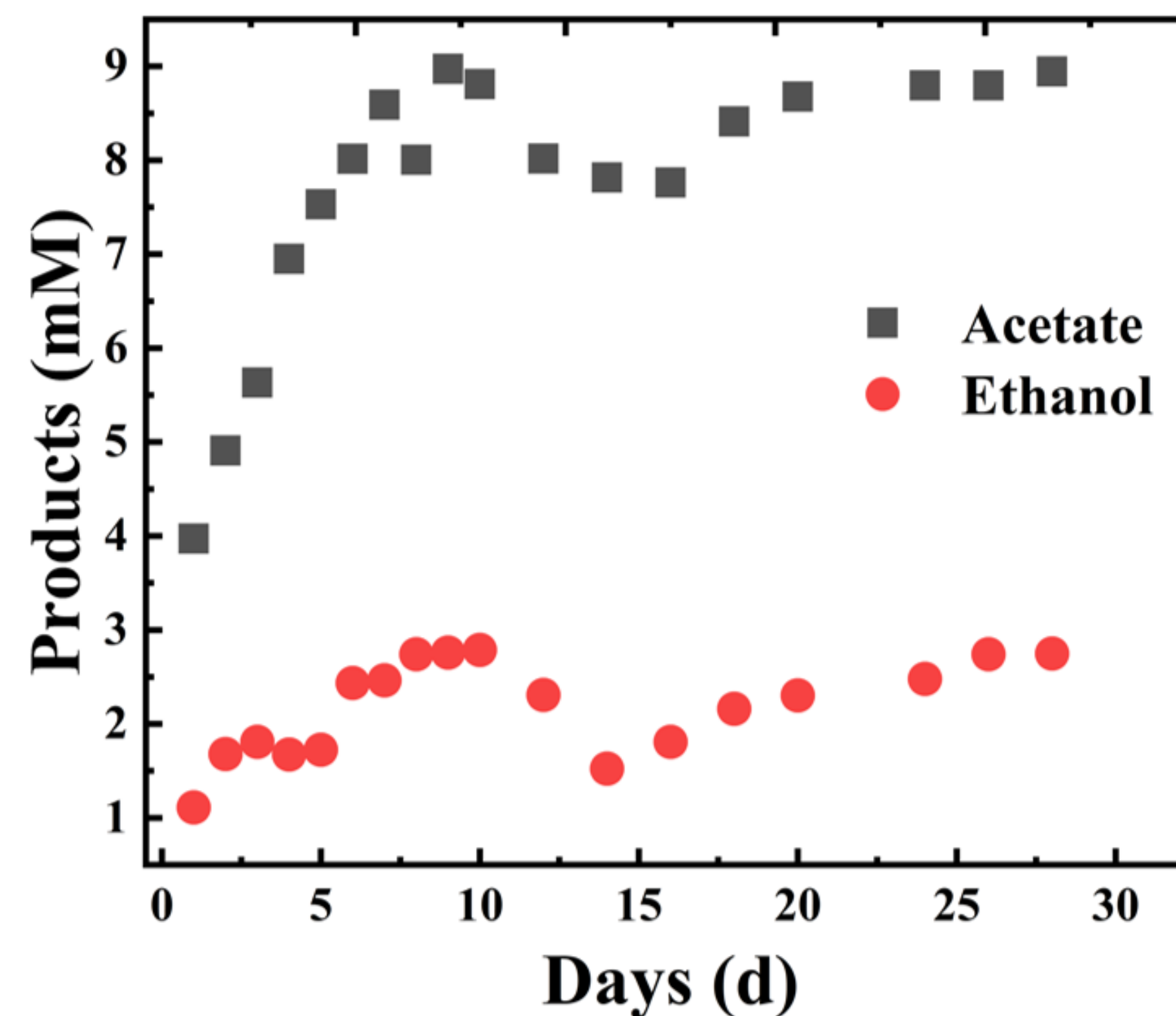


Figure 2: Example bioreactor

Methodology: Continuous, steady-state bioreactors were used to grow each bacteria in monoculture. High performance liquid chromatography was performed to assess product concentrations in *C. autoethanogenum*, and UV-Vis spectroscopy was used to determine the optical density of *R. rubrum* over time.

Product levels of *C. Autoethanogenum* over time



Results and Future Work:

- Optical density of *R. rubrum* suggests that higher acetate concentrations can be toxic to the bacteria.
- In co-culture conditions, acetate would be consumed quickly by *R. rubrum*, preventing it from accumulating in solution.
- Testing *C. autoethanogenum* and *R. rubrum* in co-culture directly will confirm whether PHB production can be increased.

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