



The Role of Exogenous Sensitizers in the Photoinactivation of Pathogenic Bacteria



Motivation:

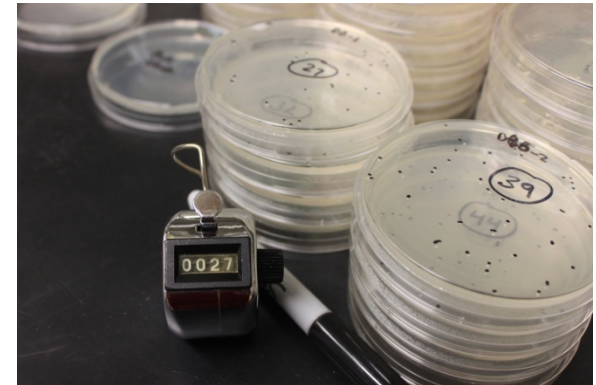
- If we want to understand the fate bacterial pathogens in environmental waters, we need to know how exogenous sensitizers will affect their rates of photoinactivation.

Background:

- Photoinactivation: The inactivation of a substance by radiant energy.
- Gram Stain: The gram-negative bacteria cell wall contains an outer membrane made of lipopolysaccharide that is not found in the gram-positive bacteria cell wall.

Scope:

- Grow bacteria in chemostat
- Prepare bacteria in three solutions
 - CBS – no sensitizers
 - RB – anionic sensitizers
 - MB – cationic sensitizers
- Expose bacteria to solar spectrum light
- Plate samples taken at determined intervals during exposure
- Count the number of CFU's present on each plate
- Determine the photoinactivation rate for each bacteria in each solution

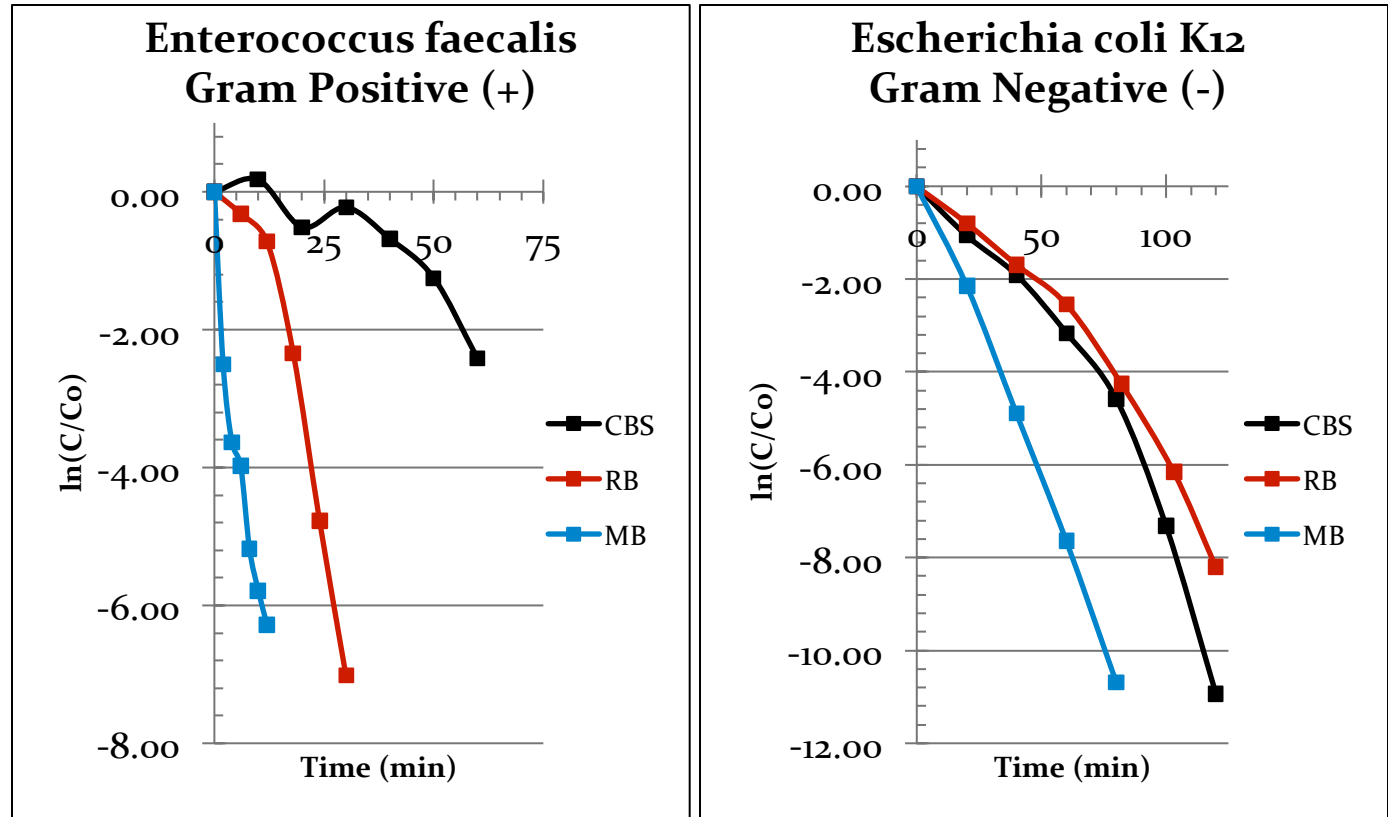


Research Question: How does the charge of various sensitizers affect the photoinactivation of gram-positive and gram-negative bacteria?

Results:

Photoinactivation Under Full Spectrum Irradiation

- Anything to the right of CBS suggests that the presence of exogenous sensitizers is hindering photoinactivation by blocking sunlight.
- Anything to the left of CBS suggests that the presence of exogenous sensitizers is aiding photoinactivation by generating ROS.



Conclusion: In correspondence with other published works, these results suggest that cationic photosensitizers may have a broader application in the photoinactivation of bacterial cells than the anionic photosensitizers because of their ability to affect both gram-positive and gram-negative bacteria.