

Abstract Submitted
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Spectrophotometric Analysis of Bacterial Contamination in Water SARAH SPENCE, Colorado School of Mines — Bacterial contamination in water is a hazard everywhere from wells in third world countries to reclaimed water on the International Space Station. Traditional lab techniques detect bacteria in approximately 48 hours, while optical techniques can detect bacteria in as little as six hours. The Beer-Lambert Law states that absorption of light is directly correlated to the concentration of a solute in a solution. By passing light through a sample of contaminated broth, the transmittance and in turn the absorption of the solution can be observed. The transmittance data alone follows the inverse of the bacterial growth curve. A sharp drop in transmittance represents the exponential growth phase of bacteria. This drop is observed between six and eight hours following the inoculation of the laboratory samples with *Escherichia coli*, using both a standard lab monochrometer as well as a device designed for this study. The Optical Bacteria Detection (OBD) was designed to be effective and inexpensive, with a limited use of consumables and minimum waste generation. The OBD device uses a phototransistor as a sensor and an LED with wavelength of approximately 500 nm. Data from the monochrometer shows the sudden decrease in transmittance is most pronounced at this wavelength. The OBD can be tuned to test for other bacteria, such as *Salmonella* and *Vibrio fisheri* by changing the wavelength of the LED light source.

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