Water Contaminant Removal: Will It Glow?

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This experiment’s goal is to investigate feasible methods for the removal of common water contaminates (copper, barium and zinc) and determine which is most effective. Solving this problem would help people in third world countries decontaminate their water supply more efficiently and more cost effectively. It would also impact ecosystems around the world by decreasing the amount of metals allowed into rivers and soil. This study hypothesizes that if activated charcoal, chemical precipitation and ion exchange are used to remove copper, barium and zinc from the contaminated water, then ion exchange will be the most effective in removing the chemicals and cause the bioluminescent bacteria to luminesce more brightly, providing safer drinking water for third world countries. To test this, four solutions were created using deionized water and barium, zinc, copper and all three together. The solutions were put through the various decontamination methods and the effluent was collected. Bioluminescent bacteria dim their fluorescence when in the presence of chemicals; 2.2 mL of each effluent was added to the V. fischeri plates (3 trials per chemical per method). A photography setup was constructed to take pictures of the luminescence in complete darkness. Imaging software was used to determine the luminescence; the conclusions made from the experiment were that the chemical precipitation method was the most successful in removing the zinc and barium. The activated charcoal method was the most successful in removing the solution containing all the contaminants. The outcome of this experiment proved that ion exchange was not, in fact, the best method to decontaminate the water. Activated charcoal was found to be the most applicable and effective to use in third world countries.

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