The Effect of EDTA Chelation as a Desorption Mechanism

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Due to the constant lead poisoning of civilians around the world, the field of biosorption as a purification method is quickly growing and developing. This process is done using common baker's yeast, Saccharomyces cerevisiae, to absorb lead nitrate ions from a sample of water and purify it. However, in many areas where this mechanism is needed, such as in third-world countries, a plethora of yeast is not available for this use- conservation of the materials possessed is key. Ethylenediaminetetraacetic acid (EDTA) is an antioxidant, commonly used in treating heavy metal poisoning in the body. The goal of this experiment is to determine the effectiveness of EDTA chelation by testing samples of yeast with different concentrations of EDTA (low- 1 gram/liter, medium (1.5 grams/liter, and high (2 grams/liter). Procedurally, samples of yeast that have already absorbed lead ions will be treated with EDTA and tested to estimate the efficiency of the EDTA chelation mechanism as a desorbing agent. The hypothesis states that the highest concentration of EDTA will produce the highest ppm desorbed. After the desorption process finishes, the samples of water will be tested, using a lead indicator solution and a colorimetry scale, for the concentration of lead. The results of the experiment did show that the EDTA chelation was extremely effective at removing the metal ions from the yeast cells, and the high concentration was the most effective and can be employed in the water crises of many third world countries, possible improving the biosorption process for the future.

Awards Won:

Drexel University: Full tuition scholarship $194,000