The Effect of Casein Polymers on the Filtration of Heavy Metals and Contaminants in Well Water

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As a member of the Nanticoke Tribe, I am acutely aware that my tribe, along with many other tribes throughout the continent, face a continuous problem due to contamination of their natural water resources. The objective of this experiment is to enhance the performance of a charcoal filtration system through the use of casein powder. It is hypothesized that: if powdered casein is used in conjunction with to charcoal as a filter for well water, then the levels of heavy metals and E. coli bacteria will be lower than they are in water only filtered with charcoal. This is presumed because casein contains four different types of coil strands, Alpha s1- Casein, Alpha s2-Casein, Beta-Casein, and Kappa-Casein. The properties of these strains include coils containing two non-polar hydrophobic ends with a polar and hydrophilic center, another containing two dipolar ends, a random coil containing positive s-ions, and a final coil strand that surrounds the other forms of casein to create the entire Casein Micelle. The purpose of this experiment is to observe the filtration properties of casein in conjunction with activated charcoal to remove nitrates and E. coli. It is presumed that the tightly woven properties of the Kappa-Casein may entrap any E. coli bacteria attempting to pass through. It is also presumed that the structural components of Beta-Casein containing positive ions may bind with the nitrates and other negative ions during filtration. Though the Casein-Activated Charcoal filter did not completely remove E. coli, the E. coli content was reduced by 44% by the end of filtration. In regards to Nitrates, Nitrites, Hydrogen Sulfide, Manganese, and Alkalinity, Casein was able to filter out these aforementioned contaminants with more efficiency than when compared to Activated Charcoal.

Awards Won:

Fourth Award of $500