Biochemical Properties of Laundry Detergent

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EXTENDED ABSTRACT

The goal of the research was to test various laundry detergents and determine if factors such as concentration, brand, fragrance, etc… have a major impact on the results of the chemical oxygen demand tests (COD) and the biochemical oxygen demand tests (BOD). Because gray water is not easily collected NSF International has released a formula to produce synthetic gray water from a variety of household products (detergent, soap, shampoo, conditioner, etc) as well as analytic grade lab chemicals (sodium phosphate, calcium sulfate, boric acid, lactic acid, etc). This formula specified the amount of the household product but not the brand of the product to use. The brand of detergent used to produce the synthetic grey water could impact the final characteristics of the gray water.

Three detergent brands (2X Ultra All with Oxi-Active Stainlifters, 3X Ultra All with Stainlifters free and clear, and 2X Gain) were diluted as if a full load of laundry was being done and ran in triplicate for both chemical oxygen demand (COD) and five-day biochemical oxygen demand (BOD_5) tests. COD tests were performed first in order to approximate the BOD_5 of the sample. The approximated BOD_5 (0.667 COD) was then used to determine the amount of seed water and nutrient water needed to dilute the detergent sample for the BOD_5 test. Testing to date suggests that diluted detergents have similar COD characteristics ranging from 240 to 260 mg/L COD. An interesting discovery was that the 3X strength detergent did have the highest COD compared to the other 2X strength detergents. While BOD_5 testing is not complete, it is anticipated that diluted detergent samples will have similar BOD_5 characteristics ranging from 160 to 175 mg/l.