



**AQUAFIX**  
Wastewater Laboratories  
University of Wisconsin Research Park

# Comparing the Effectiveness of Liquid and Dry Formulations of SmartBOD and Glycerin-Based Supplementation in Aerobic Activated Sludge Systems

Smart BOD Laboratory Study



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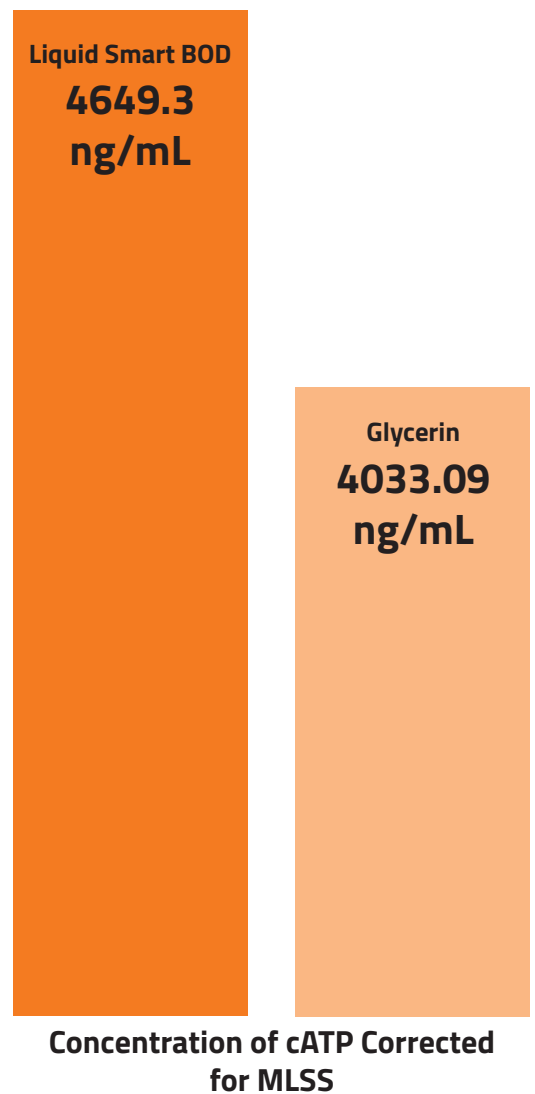


## Summary

This case study explores the efficacy of liquid and dry formulations of SmartBOD, compared to glycerin-based supplementation, in improving wastewater treatment processes. Focusing on aerobic activated sludge systems, the study aims to enhance microorganism health and effluent quality, with a particular emphasis on the newly introduced liquid formulation of SmartBOD.

Liquid SmartBOD  
had

**1.15x**  
more cATP than  
glycerin alone



## Background

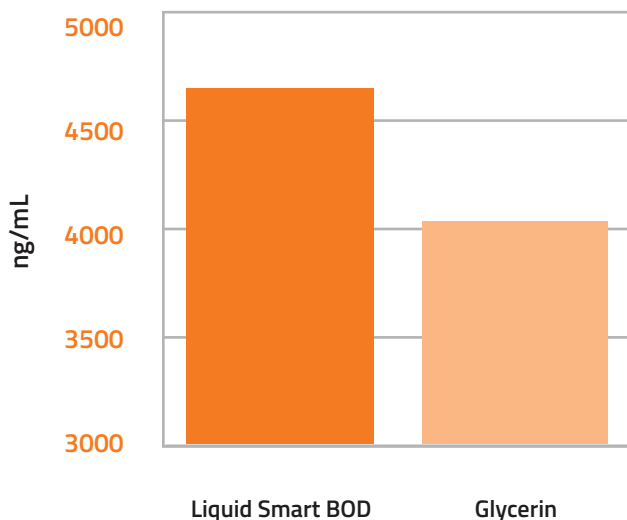
Aquafix Inc. offers a wide range of wastewater treatment products designed to optimize the conditions for wastewater treatment. The dry formulation of SmartBOD has been well-established for its effectiveness in enhancing food, nutrient, and floc conditions within activated sludge processes. With the introduction of a liquid formulation, there's a need to assess its performance relative to the dry formulation and conventional glycerin-based supplements.

## Methods

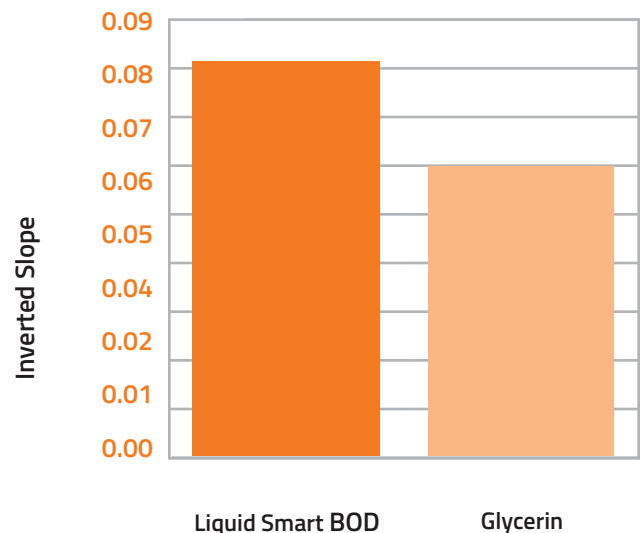
The study was conducted over a four-week period, during which three groups of activated sludge cultures were supplemented with either dry SmartBOD, liquid SmartBOD, or a crude glycerin-urea mix. Each group received an equivalent daily dose of BOD per reactor volume. The cultures underwent bi-weekly wasting and effluent samples were collected thrice weekly for analysis of chemical oxygen demand (COD), ammonia, nitrite, nitrate, and phosphates. Additionally, adenosine triphosphate (ATP) concentrations and oxygen uptake rates (OUR) were measured to assess biomass health and activity.

### Concentration of cATP

#### Corrected for MLSS



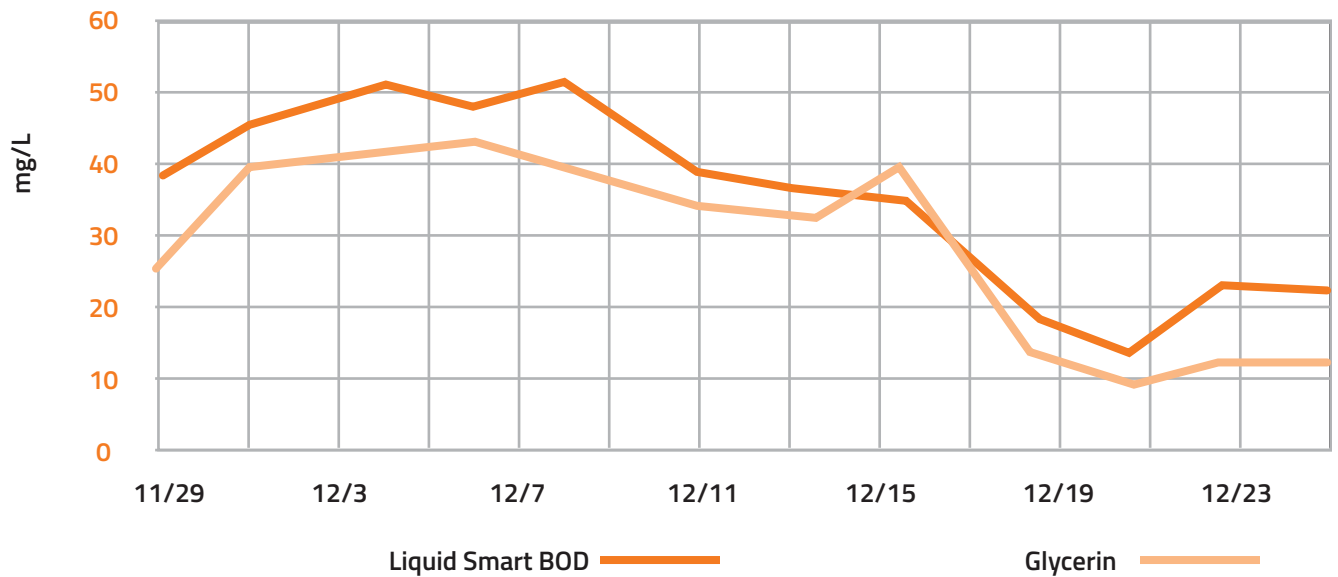
### Average OUR



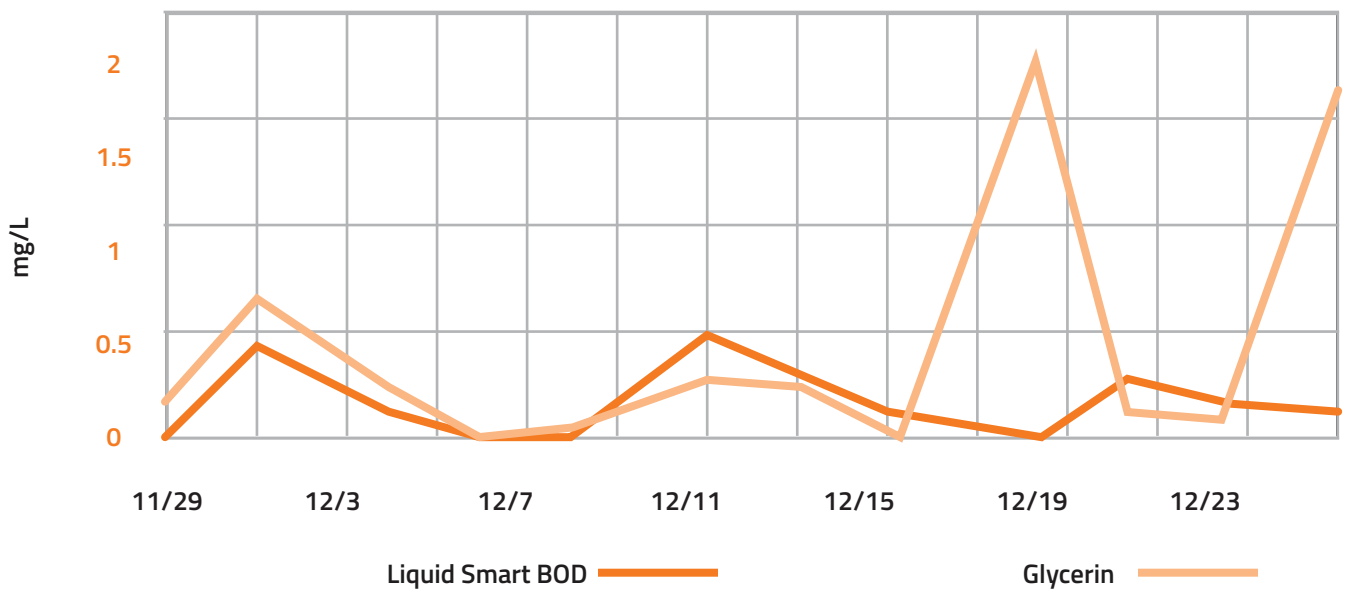
# Results

Results indicated that the liquid SmartBOD formulation matched the dry SmartBOD in all measured aspects, showing no significant differences in nutrient utilization. Both SmartBOD formulations demonstrated superior performance over the glycerin-based supplement, particularly in ammonia removal, OUR, and ATP concentration, indicating a healthier and more active biomass.

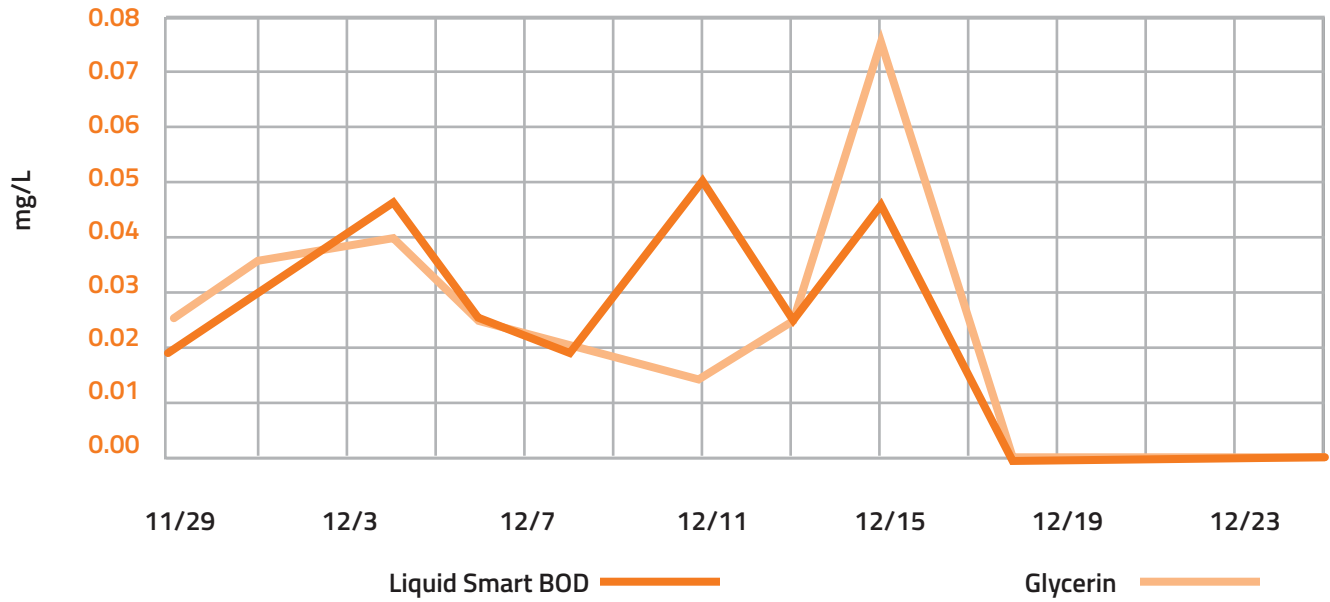
## Chemical Oxygen Demand (COD)



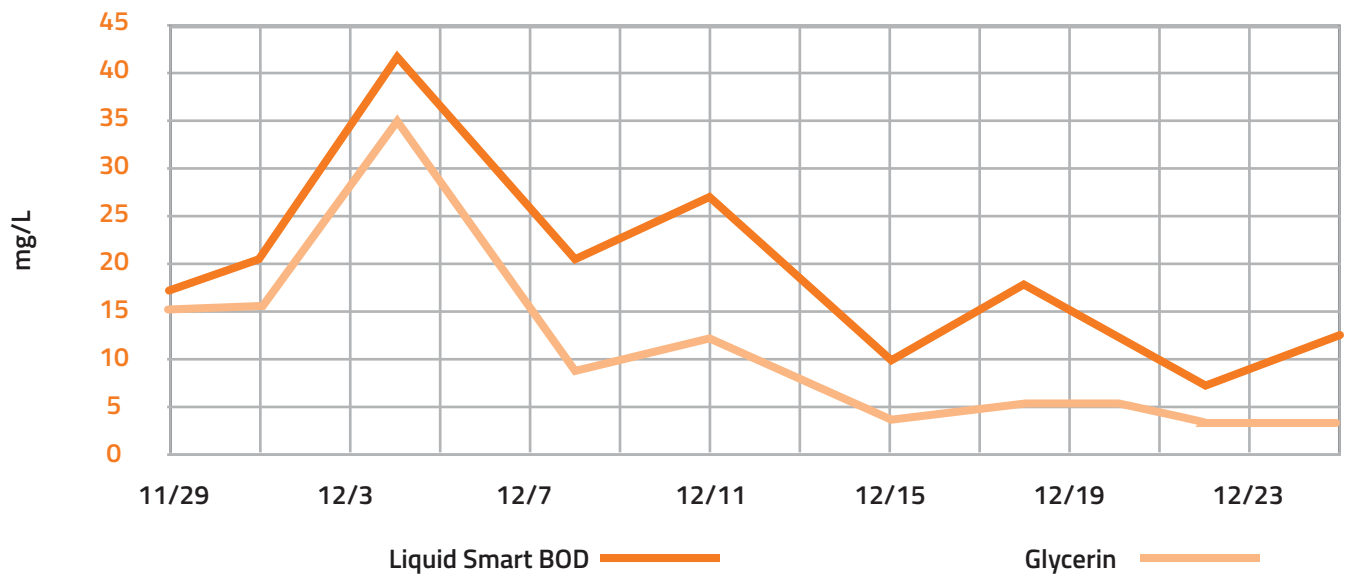
## Ammonia



## Nitrite



## Nitrate



## Conclusion

Adenosine triphosphate (ATP) is often referred to as “the molecular unit of currency” and is found in all known forms of life. ATP has a vital role in nearly all biological processes, from protein synthesis to cellular communication. In wastewater ATP can be used as a tool to quantitatively evaluate the quality of biomass. By using mixed liquor suspended solids (MLSS) to correct our measurement of cellular ATP, or cATP, we can demonstrate an apples-to-apples comparison of the overall health of different mixed liquors. In this way we can demonstrate that the mixed liquor fed liquid SmartBOD had approximately 15% more cATP than the glycerin fed counterpart.

The liquid SmartBOD formulation is equally effective as its dry counterpart, offering the added benefit of convenience without compromising on wastewater treatment efficacy. This study confirms that both SmartBOD formulations surpass glycerin-based supplementation in improving aerobic activated sludge system performance, thereby enhancing microorganism health and effluent quality.



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