

# Review of: "Cooling Beer With a Wet Paper Towel"

M.S. Misaran<sup>1</sup>

<sup>1</sup> Universiti Malaysia Sabah

**Potential competing interests:** No potential competing interests to declare.

This paper investigates the effectiveness of the popular method of wrapping a beer in a wet paper towel to accelerate its cooling in a freezer. The authors conducted experiments and simulations to determine whether the wet paper towel acts as an insulator, slowing down the cooling, or if evaporation from the towel enhances the cooling process.

One of the most important findings was the effect of advection. When beers were positioned near the freezer fan, hence enhancing advection, the chilling time was lowered by a considerable % -70 % . In this case, the presence of the moist paper towel had a modest effect. However, in conditions with decreased advection, the wet paper towel exhibited its effectiveness by shortening the cooling time by roughly 25 % . Numerical simulations done throughout the investigation validated the actual findings, especially when boundary conditions that approximated convection were employed. In conclusion, while the wet paper towel does aid in the cooling process, its effect is modest, resulting in a 23% reduction in cooling time. In contrast, air advection plays a pivotal role, slashing the cooling time by 60% to 70%.

The authors skillfully combine experimental and numerical methods, offering a comprehensive view of the cooling process. Their innovative use of infrared imaging provides a clear visual of heat transfer, enhancing the study's depth. Moreover, the experiments are designed with accessibility in mind, using low-cost equipment, making it easy for others to replicate. Beyond the specific topic, the paper delves into broader principles of physics and engineering, showcasing its wide-ranging implications.

Here are some of my critiques of this paper that the author can take note and improve upon;

1. **Generalization of Results:** The study used a specific type of beer and freezer. Results might vary with different beverages or freezer models.
2. **Advection Rate Measurement:** The paper didn't provide quantitative measurements of advection rates, making it hard to reproduce the experiments and understand the exact impact of airflow on cooling.
3. **Material Properties:** The paper approximated beer as a 95% water-5% ethanol mixture. Real beers have varying compositions which could affect cooling rates.
4. **Paper Towel Saturation:** The exact saturation level of the wet paper towels wasn't specified, which could influence the cooling effect.
5. **Natural Convection:** While the paper mentioned natural convection, it didn't delve deeply into its potential effects or how it might interact with the wet paper towel method.

Given the current presentation, the experiment's reproducibility is questionable due to the omission of key parameters. I

recommend a comprehensive revision, particularly focusing on enhancing the experimental methodology of the paper