Water Mineral Content and its Correlation with Pizza Crust Characteristics

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Abstract

This research aimed to investigate whether there was a correlation between mineral content and pizza crust characteristics. Water samples were collected from six locations, including Chicago, Cleveland, Philadelphia, New York City, Orlando, and a control group of distilled water. A specially calibrated spectrometer discovered the water samples' parts per million (PPM). After the crusts were made, data was collected subjectively and objectively. This research seeks to provide valuable insights into the impact of mineral content on pizza crust characteristics and may have important implications for the food industry.

Introduction

Many individuals insist that New York City tap water amplifies their pizza by giving it a unique texture and flavor. Before this study, the common synopsis was that this was due to New York City's soft water. This study sought to test multiple different cities' tap water to determine whether any correlation could be found relating mineral content to pizza crust characteristics.

Methods

A serial dilution of $MgSO_4$ and $CaCl_2$ with HNO_3 was used to calibrate the spectrometer used. To maintain the integrity of this research, a double-blind was administered, and all variables were controlled. The pizza doughs were made under identical conditions with precise timing and temperature control. The pizza crusts were objectively and subjectively evaluated using specific criteria.

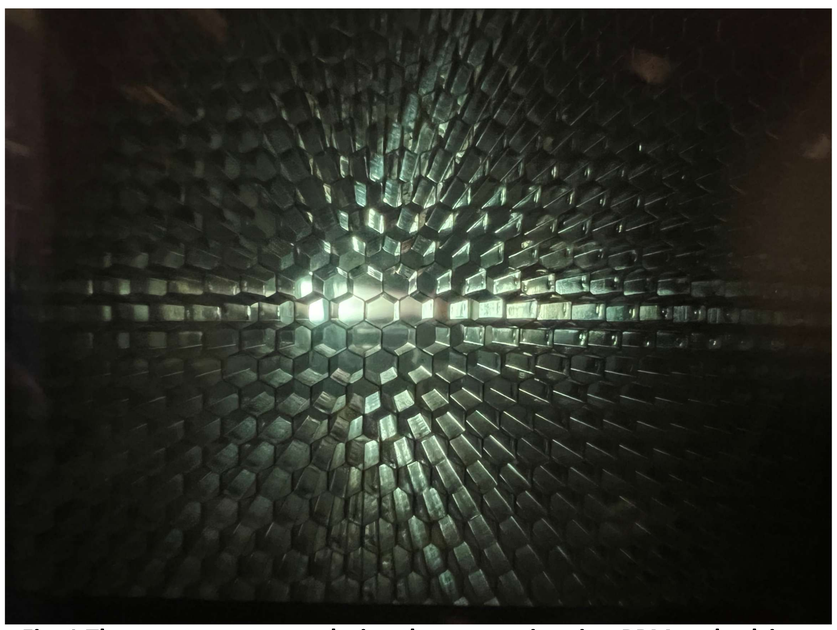


Fig. 1 The spectrometer analyzing the magnesium ion PPM and calcium ion PPM, the data collected is shown respectively in figures 2 and 3.

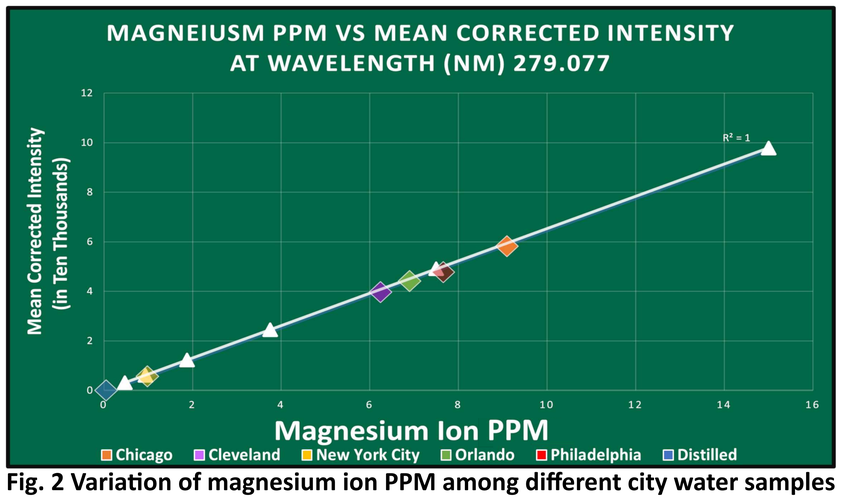


Fig. 2 Variation of magnesium ion PPM among different city water samples

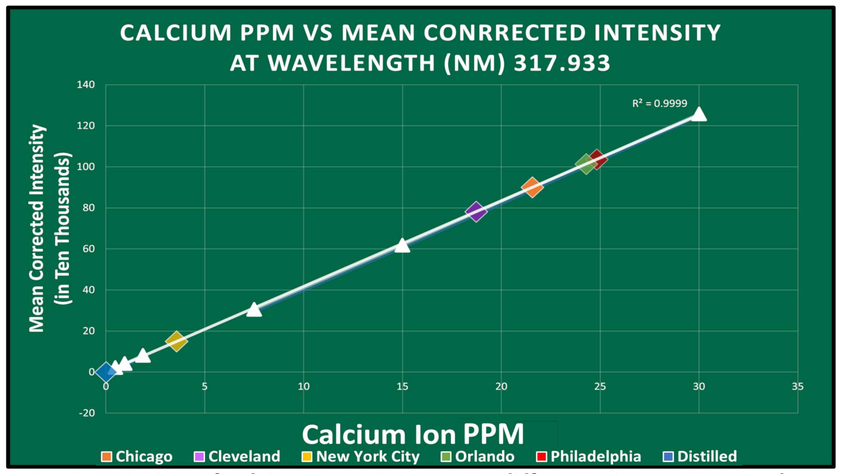


Fig. 3 Variation of calcium ion PPM among different city water samples

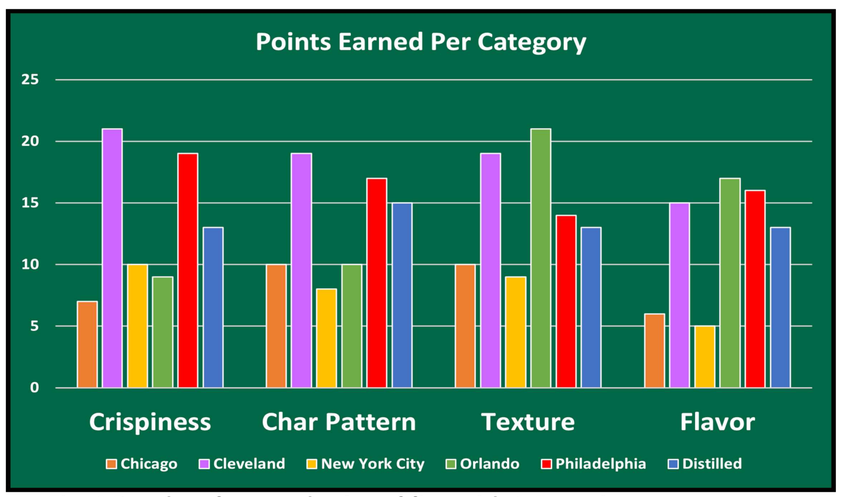


Fig. 4 Results of a sample size of five with 1-5 scoring per category

Results

- New York City water had the lowest levels of magnesium ion PPM and calcium ion PPM
- No correlation found between magnesium ion PPM or calcium ion PPM regarding subjective characteristics
- Cleveland scored the highest total subjectively
- Higher magnesium ion PPM and calcium ion PPM lead to an objectively less elastic, less dense crust with more complex gluten structures and a stronger yeast taste



Fig. 5 Pizza crusts made from various cities' water

Conclusion

New York City water had the lowest levels of magnesium ion PPM and calcium ion PPM which leads to yeast not creating as strong gluten structures. This would make sense as New York City pizza is typically thin-crust pizza without much integral structure. To make New York City-style pizza at home, dilute tap water with distilled water. Cleveland water can be diluted 1:5.9 with distilled water, while other cities such as Philadelphia require a 1:7.5 dilution.

No correlation was found between water mineral content and subjective factors; however, it is possible there was an unconscious bias towards Cleveland water since all sampled grew up on it. Another possible explanation may be how Cleveland was the most leftward hard water sample in the spectrometry results making it the least hard water tested. It is probable that both factors contribute to the observed outcome.

This research found that higher quantities of magnesium ions and calcium ions attributed to a less elastic, less dense pizza crust with a more complex gluten structure and stronger taste of yeast. This is due to the fact that more minerals in the water aid yeast in growing stronger and more gluten structures.

Acknowledgements

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