

The Effect of Natural Compound in Binding and Reducing Off-Flavors Components of Garlic

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ABSTRACT

Garlic breath is one of the pertinent oral malodor caused by garlic off-flavor compounds. Deodorization techniques are needed to reduce and bind off-flavors components of garlic, such as diallyl disulfide, allyl mercaptan, allyl methyl disulfide, and allyl methyl sulfide. The effect of natural compounds in the headspace of garlic was investigated using solid phase micro-extraction and gas chromatography. Garlic powder was blended with water (control, 10% m/v), Chlorophyll, Sodium Chlorite, Copper Sulfate, Zinc Sulfate, and Zinc Chloride. The presence of compounds reduced the intensity of the off-flavor garlic compounds. The significance of this project will be useful to address the current concern in food science and human health area for malodor matter, giving additional insight to the society about the ability to solve the breath odor problems.

OBJECTIVES

1. Compared the effect of natural and chemical suppressors in reducing the off flavor components of garlic.
2. Determined the most significant and effective natural suppression compounds in binding the binding the off-flavors garlic compounds.
3. Analyzed the affected off-flavor compounds in garlic.

MATERIAL AND METHODS

MATERIAL

- Garlic powder (Tone's)
- Treatments: 100% Liquid Chlorophyll, 5% Sodium Chlorite (m/v), 5% Copper Sulfate (m/v), 5% Zinc Sulfate Heptahydrate (m/v), and 5% Zinc Chloride (m/v).
- Hewlett-Packard GC System (Model 6890)
- Supelco 2 cm-50/30 μm dvb solid phase micro extraction (SPME) fiber

METHODS



- Prepared 10% of garlic powder (m/v) to distilled water (control) or treatment solutions.
- Placed the solution into the bottle with sealed cap to be mixed for 25 mins.
- Headspace volatile compound was absorbed into SPME fiber for 40 minutes at 40 C.
- SPME fiber was thermally desorbed into the GC system for the analysis of the flavor compounds.



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INTRODUCTION

Due to the antimicrobial characteristics and abundant health benefit, garlic is widely consumed and used in the condiment. Consumption of garlic can result in a desirable garlic breath that could persist for almost 24 hours. Therefore, finding ways to deodorize garlic breath is important in find ways and off-reducing compounds of deodorizing garlic breath. In the experiment, the Headspace analysis was chosen to imitate the real garlic breath application. The natural treatments were chosen due to the positive consumer perception towards natural products.

RESULT AND DISCUSSION

Several high intensity major compounds were analyzed to observe the changes as the effect of treatments. Based on the graph below, the treatments (Chlorophyll, Sodium Chlorite, Copper Sulfate, Zinc Sulfate, and Zinc Chloride) significantly reduced the garlic compounds, with Sodium Chlorite as the most effective treatment (91.7% reduced the specific garlic compounds for more than 50%). Chlorophyll and Zinc Chloride are the second and third most effective in reducing the garlic off-flavors for more than 50% from the initial amount.

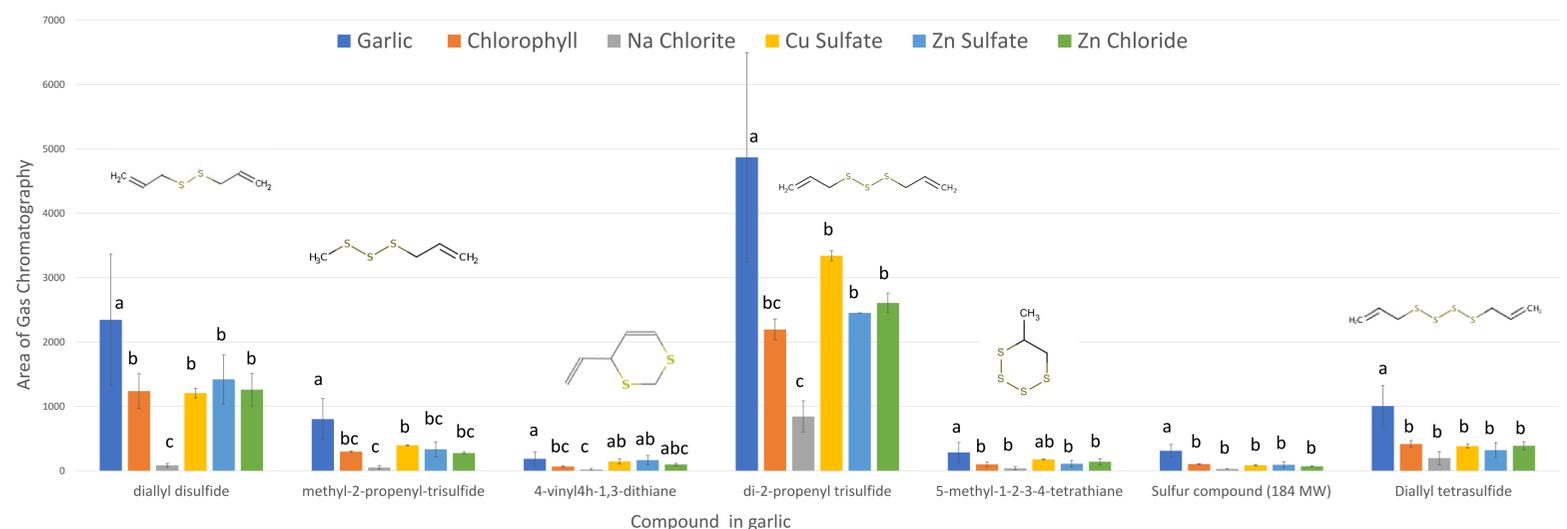


Figure 1: Flavor Intensity Summary

*Means with different letters are significantly different (Tukey's HSD $P < 0.05$)
*n = 3 (each sample)

The most affected compounds in garlic are methyl-2-propenyl-trisulfide and diallyl tetrasulfide, which the reduction in compound intensity was more than 50% in each treatment, with Sodium Chlorite as the most effective reducer.

CONCLUSIONS

- Each treatment reduced the intensity of garlic off-flavor in the headspace, with different efficacy and significance for each compound.
- Sodium Chlorite, followed by Chlorophyll and Zinc Chloride as the most effective chemical compounds in reducing and binding the headspace garlic volatile compounds.
- Methyl-2-propenyl-trisulfide and diallyl tetrasulfide retention time are the most affected compounds by treatments.