

Decomposition of coke ingredients using bread

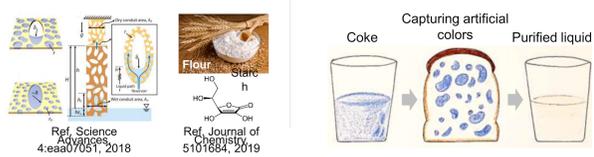
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RESEARCH OVERVIEW

- Current Issue** – Artificial colors are often added to make food and beverages taste better visually. However, consuming large amounts of artificial colors can cause allergies, kidney failure, and carcinogenesis. [1-3] In addition, when drinks containing artificial colors are thrown away, they can cause environmental pollution.
- Abstract** – In this study, the removal method of the artificial color from coke using milk bread was investigated. Numerous pores in the milk bread quickly absorb the solution, and flour and yeast, the main ingredients of the bread, capture the artificial color. In this sense, if the number of pores and the mixture ratio of bread ingredients are controlled, the absorption of artificial colors can be further increased. It is expected that consuming beverages containing artificial colors with bread can reduce the amount of artificial colors absorbed into the body, and the leftover bread could contribute to reducing environmental pollution by absorbing artificial colors from discarded drinks.

Schematic of "Decomposition of coke ingredients using bread"

Porous structure and Bread ingredients Bread decomposition effect



METHODS

- Investigated which pristine bread ingredients can decompose coke ingredients
- Investigated whether bread ingredients after cooking (180 °C for 30 min) can decompose coke ingredients
- Decomposition of coke ingredients using bread
- (Applications) Investigated the decomposition of coke ingredients using various foods



Figure 1. Strong bonding of artificial color absorption



Figure 2. Role of pores/ingredient of bread

Decomposition of coke ingredients using milk bread

- Investigated which pristine bread ingredients can decompose coke ingredients – Experiment on which material has the most significant effect on decomposing the components of coke
- Investigated whether bread ingredients after cooking (180 °C for 30 min) can decompose coke ingredients – Experiment on which material has the most significant effect on decomposing the components of coke after applying temperature
- Decomposition of coke ingredients using bread – Coke ingredient decomposition properties
- (Applications) Investigated the decomposition of coke ingredients using various foods – Coke ingredient decomposition properties

RESULTS AND DISCUSSION

1. Absorption Mechanism: Pore structure and chemical ingredient

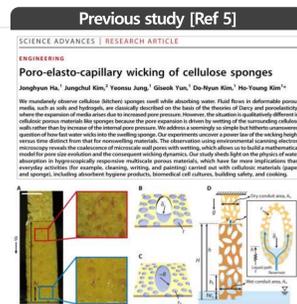


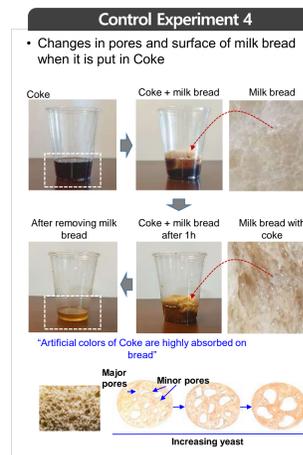
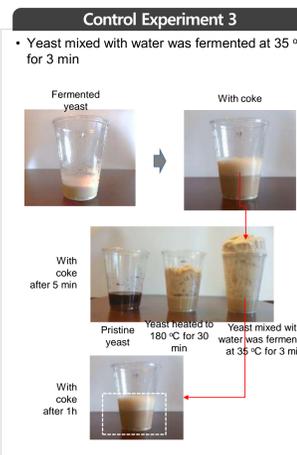
FIG. Cellulose sponge (A) Optical image of a cellulose sponge wetted by water. (B) Schematic of liquid-filling behavior in the late stages. Macro voids are not completely filled with liquid due to gravitational effects, whereas micropores are fully occupied with liquid. (C) Schematic of a macro void of radius R in a microporous sheet in the early stages. Both macro and micro voids are completely filled with liquid. (D) The liquid permeates into micropores from the wet corner of macrovoids. Black box shows the liquid path near the wetting front.



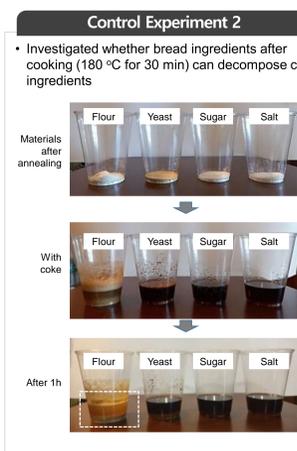
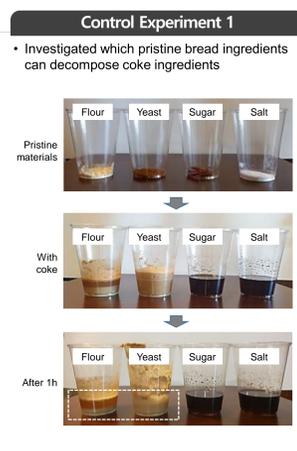
Is baking a chemical change? Heat causes the molecules in the ingredients to break apart and rearrange into new arrangements, resulting in the formation of new chemicals. Chemical changes occur when the composition of a substance is altered at the molecular level, and this is what happens when flour is transformed into bread or cake. For example, when you cook flour and water together, they chemically react to form new gluten molecules. These molecules give bread its chewy texture. Similarly, adding baking powder to your batter causes a chemical reaction that produces carbon dioxide gas. This gas makes your pancakes nice and fluffy! Some of the most important chemical changes that occur during baking include the following:

- The Maillard reaction: This chemical reaction between amino acids and reducing sugars gives baked goods a brown color and delicious flavor.
- Starch gelatinization: This is the process of starch molecules absorbing water and expanding, which helps to make baked goods less dense and more fluffy.

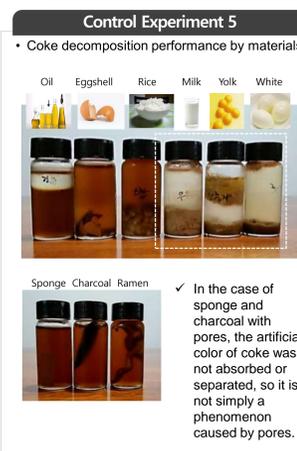
3. Absorption of coke ingredient into bread ingredient



2. Absorption of coke ingredient into bread ingredient



4. Absorption of artificial color of coke into bread ingredient



CONCLUSIONS

- In summary, a method for selectively removing artificial color from coke using the pores and ingredients of bread was investigated.
- The amount of yeast determines the size and number of pores.
- In addition, starch, the main component of flour, is a natural polymer compound with a net-like structure. Starch in flour has a strong chemical bonding with tar components (benzene, xylene, toluene, and naphthalene) in artificial colors.
- Yeast determines the size and number of the pores. The pores in bread absorb liquid quickly.
- The flour and yeast served to hold the artificial color.
- Bread was able to absorb the artificial color in coke effectively. It quickly absorbed at the beginning and saturated in 1 h.
- Accordingly, the pores of the bread acted to absorb the liquid quickly, and the flour and yeast served to hold the artificial color.
- Therefore, if there are bread residues containing wheat and yeast ingredients that are not absorbed by the stomach, they will be excreted out of the human body again after absorbing the artificial colors.
- It is also expected to serve as a filter that absorbs artificial colors in beverages that are discarded as leftover bread.

FUTURE STUDY

- Development of a pill that can reduce the absorption of artificial colors using the characteristics of flour/yeast and pore structures



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INTRODUCTION

Issue. Deterioration of health / Environmental pollution

- Natural colors are harmless to the human body but have disadvantages such as poor color clarity and easy discoloration by heat and light.
- Therefore, artificial colors are widely used in food and beverages due to their low price and excellent visual effects. However, artificial dyes can cause cancer, skin allergies, and ADHD. [4]
- In addition, if beverages containing artificial colors are thrown away, it causes environmental pollution.

Question. What kinds of natural materials can be used to solve the issue ?

- A method for effectively adsorbing artificial colors contained in beverages was investigated using the strong absorbent properties of milk bread.

Suggestion. Using milk bread as a filter to remove artificial dyes from beverage !

- Numerous pores in the bread quickly absorb the solution
- Flour and yeast, the main ingredients of the bread, capture the artificial color.

What are the ingredients of Coke ?

- Carbonated water** – Approximately 90% of coke is water. The carbonated part is purified carbon dioxide, which gives the drink its "bubbles" or "fizz".
- Sugar** – Coke's sweet taste (and also some of its mouthfeel) comes from sugar.
- Caramel color** – A very specific caramel is made especially for coke, to give the drink the specific color.
- Phosphoric Acid** – The tartness of coke comes from the use of phosphoric acid.
- Caffeine** – The slight bitterness in the taste of coke comes from caffeine.
- Natural flavors** – The essence of the secret formula of coke is its blend of natural flavors. This is the most protected and secret part of the formula.

Ref. <https://www.coca-coke.co.uk/our-business/faqs/what-are-the-ingredients-of-coca-coke-classic>