

IDENTIFICATION OF BORAX AND FORMALIN CONTENT IN WET NOODLES AND MEATBALLS IN GORONTALO CITY

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ABSTRACT

This study aims to determine the presence of additives in food samples in wet noodles and meatballs.

The research method used is an analytical method with an experimental design (pre-experimental, the object of research is wet noodles and meatballs. Then both samples are added with formalin and borax to determine whether the two samples contain borax and formalin or not.

The results showed that none of the samples contained borax. If a food contains borax, then when the food is dripped with borax (indicator) it will experience a color change to brick red. However, during the formalin test, some of these foods contain formalin, namely, wet noodles, and meatballs, where this is known from the changing color, namely when the two samples are dripped with CuSO₄ there is a change in color, namely a yellowish color which indicates that the sample contains formalin.

Keywords: formalin, borax, cuso₄

INTRODUCTION

Our staple foods contain carbohydrates, protein, calcium, iron, vitamins and others. However, in the processing many other chemicals are added which are intentionally or unintentionally added. Chemical additives in food are generally known as food additives. These additives can add taste, aroma, and color that can attract consumers' tastes. Food additives are used to make food look more attractive and last longer; These ingredients can be used as preservatives, dyes, flavorings and aromas, antioxidants, and others. So that these foodstuffs have no nutritional value [2].

The use of these foodstuffs in Indonesia has been determined by the government based on the Act, Regulation of the Minister of Health and others. In addition, Law Number 7 of 1996 concerning Food Article 10 paragraphs 1 and 2 along with their explanations is

closely related to food additives which in essence is to protect consumers so that the use of these food additives is truly safe for consumption and does not harm. [2].

One of the additives that are prohibited from being used in food is boric acid and its salt sodium tetraborate (borax). Borax comes from the Arabic word Bouraq. Is a soft crystal containing the element boron, white, odorless and stable at normal temperature and pressure? Borax is easily soluble in water, insoluble in alcohol, pH 9.5. In water, borax turns into sodium hydroxide and boric acid [2].

Every day we need food for energy (carbohydrates and fats) and for the growth of new cells, replacing damaged cells (protein). In addition, we also need food as a source of supporting substances and regulating processes in the body, namely vitamins, minerals, and water [3].

Healthy or not a food does not depend on the size, shape, color, delicacy, aroma,

or freshness, but depends on the content of substances needed by the body. A food is said to be healthy if it contains one or more kinds of substances needed by the body. Every day, we need to eat a variety of foods so that all types of substances needed by the body are met. This is because not necessarily one type of food contains all the types of substances needed by the body every day [3].

So that people are interested in eating a food, we often need to add additional ingredients to the food we process. We can predict that someone will certainly not have the appetite to eat vegetable soup that is not salted or green bean porridge that does not use sugar. In this case, salt and sugar are additives. Both include types of food additives. Additives are not only salt and sugar, but there are many other chemicals [3].

Food additives are added and mixed during food processing to improve the appearance of food, improve taste, enrich nutritional content, keep food from spoiling quickly, and so on. [3].

Additives are not only substances that are intentionally added during the food processing process, but also include substances that enter accidentally and mix with food. The entry of these additives may occur during processing, packaging, or has been carried away by the chemicals used. Food additives can be grouped into two groups, namely: Additives derived from natural sources, such as lecithin and citric acid, and synthetic additives from chemicals that have similar properties to similar natural materials, both chemical composition and properties/functions. such as amyl acetate and ascorbic acid [3].

Food and beverage additives are substances added during the production, packaging, or storage processes so that the quality and stability of food and beverages is maintained and to maintain nutritional value that may be damaged or

lost during the processing. At first these additives came from plants called natural additives. Generally, natural additives do not cause side effects that endanger human health. However, the population of the earth is increasingly demanding a greater amount of food and drink so that natural additives are no longer sufficient. Therefore, the food and beverage industry uses artificial (synthetic) additives. The raw material for its manufacture is from chemical substances which are then reacted. Excessive synthetic additives can cause some side effects [3].

There are various additives used by food and beverage manufacturers such as sodium benzoate, vitamin C, and caffeine for each specific purpose. The three additives are compounds that have different polarity properties and have chromophore groups that cause these compounds to absorb UV light. Based on the characteristics of this compound, it is possible to carry out analysis using HPLC techniques using a nonpolar column such as C-18 and a polar mobile phase [2].

Additives are substances added to food during the production, packaging or storage process for a specific purpose. The addition of additives in food is based on considerations so that the quality and stability of the food is maintained and to maintain the nutritional value that may be damaged or lost during the processing [2].

Borax is a sodium salt of $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ which is widely used in various non-food industries, especially the paper, glass, soldering materials, cleaning agents, wood preservatives, antiseptics, cockroach control and ceramics. The famous pyrex glass is made with a borax mixture. Borax is a toxic and hazardous material for humans, because it can cause toxic effects, and if consumed chronically can cause cancer. But the mechanism of toxicity is different from that of formalin [2].

Formalin is Formaldehyde or Methanal HCHO which is a colorless solution and has a pungent odor, at room temperature in the form of a gas that can be dissolved in alcohol, acetone or water. In the chemical industry, it is very important as a disinfectant, fungicide, bactericide, resin-making material and corpse preservative [2].

Formalin is a colorless solution and has a very pungent odor. Formaldehyde contains about 37 percent formaldehyde in water, usually plus up to 15 percent methanol as a preservative. Formalin is known as a pest killer (disinfectant) and is widely used in industry. Other names of formalin are Formol, Methylene aldehyde, Paraforin, Morbucid, Oxomethane, Polyoxymethylene glycols, Methanal, Formoform, Superlysoform, Formaldehyde, and Formalith. [1].

Formaldehyde (CH₂O) is an aldehyde derivative that has a pungent odor. These chemicals have a tendency to polymerize wherein, the individual molecules combine to form a unit of high molar weight. This polymerization activity releases heat which often occurs explosively. Formaldehyde, better known as formalin, is one of the prohibited food additives.

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in the body to form compounds that precipitate.

Dangers of Formalin on Health Food is an important part of human health considering that at any time there can be diseases caused by food. Cases of foodborne disease can be influenced by several factors, including traditional food processing habits, unclean storage and presentation, and not meeting sanitation requirements.

According to the International Program on Chemical Safety (IPCS) the formalin threshold in the body is 1 mg in food, the formalin that can enter the body is between 1.4 to 14 mg. If formalin enters the body beyond the threshold, it can cause disturbances to organs and body systems. Formalin, which accumulates in cells, reacts with cellular proteins (enzymes) and DNA (mitochondrion and nucleus). The use of formalin in food is very harmful to health, both short and long term.

This depends on the dose and duration of exposure in the body. Some short-term negative effects due to formalin exposure include irritation of the respiratory and digestive tracts, vomiting, dizziness. Long-term effects can cause damage to the liver, kidneys, heart, spleen and pancreas as well as the occurrence of premature aging [4].

Formalin can react quickly with the mucous lining of the digestive tract and respiratory tract. In the body, it is rapidly oxidized to form formic acid, especially in the liver and in red blood cells. The use of food can cause poisoning in the human body, namely acute abdominal pain accompanied by vomiting, the onset of nervous system depression or circulatory failure.

Several studies on rats and dogs show that giving formalin in certain doses in the long term can cause gastrointestinal cancer. Other studies mention an increased risk of cancer of the pharynx

(throat), sinus, and nasal cavity (nose) in textile workers due to exposure to formaldehyde through inhalation [7].

Although the Regulation of the Minister of Health has stated that formalin is a prohibited food additive, it turns out that in reality there are still many food traders and producers who continue to use this dangerous substance.

In addition to formalin being used as a food preservative, formalin can also improve the texture of the elasticity of food products so that they look more attractive (although sometimes the distinctive smell of the food itself changes due to formalin). Foods that are prone to being mixed with these harmful ingredients are usually ingredients for salted fish, wet fish, noodles and tofu.

Formalin is used one of them as a preservative for corpses, but recently there has been a misuse of formalin for food additives. Formalin is a chemical commonly used to kill bacteria or function as a disinfectant. This substance belongs to the group of strong disinfectants, can eradicate various types of spoilage bacteria, diseases, fungi or molds [4].

Formalin is very commonly used in everyday life, if used correctly, we will experience many benefits, for example as an antibacterial or germ killer in various types of industrial purposes, namely cleaning floors, ships, warehouses and clothes, exterminating flies and various insects. and as an adhesive for plywood (polywood) in the wood industry. Formalin is also often used as an ingredient in the manufacture of urea fertilizer. Manufacturers often do not know that the use of formalin as a food preservative is not appropriate because it can cause various health problems for consumers who eat it [7].

Borax is a preservative that is widely used in the taxidermy, insectarium and herbarium manufacturing industry, but

nowadays people tend to use it in the home industry as a food preservative such as making noodles and meatballs [5]. Borax is a white crystalline compound that is odorless and stable at room temperature. Borax is a chemical compound with the name Sodium tetraborate ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$).

If it dissolves in water it will become hydroxide and boric acid (H_3BO_3). Borax or borax acid is usually used for detergents and antiseptics. Consuming foods that contain borax does not cause harm directly, but borax will accumulate little by little because it is absorbed in the consumer's body cumulatively.

Borax (Sodium tetraborate) is a dangerous preservative that is not allowed to be used as a mixture of food ingredients. Borax is a chemical compound with the formula $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ in the form of white crystals, odorless and stable at normal temperature and pressure. In water, borax turns into sodium hydroxide and boric acid [10].

The negative effects of using borax in its improper use on life can have a very bad impact on human health. Borax has a very dangerous toxic effect on the human metabolic system as well as other food additives that damage human health [9].

Hazards that can be caused include acute (short-term) and chronic (long-term) hazards. Acute dangers from the use of borax, among others, if inhaled / inhaled can cause irritation of the mucous membranes with coughing and can be absorbed causing systemic effects such as acute effects if swallowed, when in contact with skin can cause skin irritation and can be absorbed through damaged skin. If in contact with the eyes can cause irritation, red eyes and burning sensation, and if swallowed can cause delayed symptoms including feeling unwell, nausea, severe pain in the upper abdomen, gastroenteritis bleeding with vomiting

blood, diarrhea, weakness, drowsiness, fever, and headache [8].

The chronic danger of borax is that if inhaled / inhaled for a long time and repeatedly it can cause inflammation of the windpipe (bronchitis), inflammation of the larynx (laryngitis) and other effects such as chronic effects when swallowed. When in contact with the skin for a long time and repeatedly can cause inflammation of the skin (dermatitis). If absorbed in sufficient quantities, systemic poisoning may occur as well as chronic effects if ingested. When in contact with the eyes for a long time and repeatedly can cause inflammation of the lining of the eye (conjunctivitis). If swallowed repeatedly can cause loss of appetite (anorexia), weight loss, mild irritation with digestive disorders, skin rash and redness, dry skin and mucous membranes and chapped lips, red tongue, inflammation of the lining of the eyes,

RESEARCH METHODS

Research method (used) Tools and Materials in this experiment using a petri dish, matches, lumping pestle, filter paper, test tube, erlenmeyer, horn spoon, tube clamp, chemical beaker, dropper pipette, stirring rod, and measuring cup. And the ingredients are KMnO_4 , Turmeric, Formalin, Borax. The samples are meatballs, wet noodles, aquades.

Work procedures

1. Borax (Na-Tetraborate)Turmeric Method:
 - a. Prepare tools and materials to be used
 - b. Give a label to each watch glass that has been prepared
 - c. Puree the 5 samples using a lumping pestle, and turmeric.
 - d. Put the 5 samples that have been mashed into the watch glass
 - e. Squeeze the turmeric that has been mashed and take the turmeric water and put it into a beaker

- f. Take filter paper and divide into 5 parts 5
- g. Put the 5 filter papers into a petri dish that has been filled with turmeric juice
- h. Add 5 samples into a petri dish that has been previously filled with turmeric juice and filter paper kertas
- i. Dripping borax on one of the petri dishes as a control
- j. Observing the changes that occur in the 4 samples

Flame method

1. Prepare tools and materials to be used
2. Give a label to each watch glass that has been prepared
3. Adding the sample to the petri dish
4. Add a few drops of CaCO_3
5. Measuring pH with litmus (acidic pH)
6. Observing the changes that occur in pH
7. Adding H_2SO_4
8. Measuring pH with litmus (acidic pH)
9. Adding a few drops of methanol to the sample
10. Observing the changes that occur

Formalin, Potassium Permanganate Test:

1. Prepare tools and materials to be used
2. Give a label to each watch glass that has been prepared
3. Puree the 5 samples using a lumping pestle, and turmeric.
4. Put the 5 samples that have been mashed into the test tube tabung
5. Measuring KMnO_4 as much as 2 mL
6. Each test tube was added with KMnO_4
7. Observing the changes that occur in the 5 samples

Cupri test

1. Prepare 5 test tubes which are then filled with distilled water
2. Heating 400 mL of water and waiting for the water to heat up
3. Adding a sample to each test tube
4. Adding 1% CuSO_4 to each tube
5. Observe the changes perubahan

RESEARCH RESULT

From the results of the experiments that have been carried out, the following results can be presented:

Table 1: Observation results of Borax with turmeric and flame method

NO	SAMPL E	RESULT	KET.
	Wet noodle	Shows light turmeric discoloration	Negative contains borax
	Meatballs	Shows light turmeric discoloration	Negative contains borax

Source: Practicum Report

Table 2: Results of Formalin Observation Potassium Permanganate Test and Cupri. Test

NO.	SAMPLE	RESULT	KET.
	Wet noodle	Shows a purple-black color change	Positive contains formalin
	Meatballs	Shows a fresh purple color change	positive contains formalin

Source: Practicum Results Report

DISCUSSION

Additives are substances that are usually added to a type of food or drink so that the food or drink is more attractive. Additives are divided into two, namely natural additives and artificial additives. Natural additives come from biological natural resources which generally have nutritional value. Meanwhile, artificial additives are additives that are intentionally made with the same purpose as natural additives, but have no nutritional value.

Borax is the sodium salt of $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ is widely used in various non-food industries, especially the paper, glass, soldering materials, cleaning agents, wood preservatives, antiseptics, and ceramics industries. The famous pyrex glass is made with a borax mixture. Borax is a toxic and hazardous material for humans, because it can cause toxic effects, and if consumed chronically can cause cancer, but the mechanism of toxicity is different from formalin.

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Based on this practicum, we use substances that are used as indicators to determine the content of additives in food, including borax and formalin. The food ingredients tested were meatballs, and wet noodles. During the borax test practicum on these foods, the results showed that none of these foods contained borax. If a food contains borax, then when the food is dripped with borax (indicator) it will experience a color change to brick red. However, during the formalin test practicum, some of these foods contain formalin, namely, wet noodles, and meatballs, where this is known from the changing color, namely when both samples are dripped with CuSO_4 there is a change in color, namely a yellowish color which indicates that the sample contains formalin.

Consumers' attitudes and actions so as not to make the wrong choice of food products containing borax and formalin, consumers must be more selective. Be careful in choosing food products that will be consumed by not hesitate to ask the food seller, whether the product uses

borax and formalin or not. Beware of certain products that often use borax by paying attention to their characteristics.

CLOSING

Conclusion

Based on the practicum that has been done, it can be concluded that none of the above food ingredients contain borax. Where by looking at the color formed is yellow, while in testing the formalin method on wet noodles and meatballs there are preservatives or contain formalin, namely by looking at the change in color from blue to yellowish.

Suggestion

A healthy lifestyle can minimize the impact that can be caused if we consume food with additives. Reducing consumption of canned foods from factories, consuming natural foods is one way of living a healthy life.

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