IDENTIFICATION OF BORAX AND FORMALIN ON WET MEATS AND Noodles IN GORONTALO CITY

Putri Sri Widya Yadano1), Adnan Malaha2), and Astria Lolo 3)
[1)] Bina Mandiri University Gorontalo
[2)] Bina Mandiri University Gorontalo
[3)] Bina Mandiri University Gorontalo
E-mail: putrisriwidya@gmail.com

ABSTRACT

This study aims to identify the presence or absence of borax and formalin in meatballs and wet noodles in Gorontalo City.

The type of research used in this research is descriptive with a qualitative approach. Using the curcumin paper method (tumeric) to identify the borax content and the 0.1 N KMnO4 method (Potassium Permanganate) to identify the Formalin content. The sampling technique is purposive sampling and the data collection technique is based on the results of tests conducted in the laboratory. The data processing method goes through several stages, namely editing, coding, tabulating, data cleaning, data descrbing and data analysis, namely the number of presentation frequencies is calculated using the number formula for each sample of meatballs and wet noodles that are positive for borax and formalin divided by the total number of each sample of meatballs and wet noodles.

The results of the research carried out can be concluded from the total sample of meatballs, namely 20 samples, 20 were negative Borax (0%) and 16 of them were Formalin positive (80%). while for the sample of wet noodles with a sample of 7, 6 positive results were obtained for Borax (85.71%) and 5 were positive for Foramalin (71.42%).

Keywords : Borax, Formalin, Wet Noodles, Meatballs.

INTRODUCTION

Health is a healthy condition, either physically, mentally, spiritually or socially, which makes it possible for everyone to have a productive life in a social and economic way. To achieve excellent health, we need a healthy living environment, an environment that will be infected [16].

Food is a composition which has a more vital role when it comes to maintaining our health [16]. At the stage of preparation, processing and shaping food and beverages, what is called food is used. Food is the whole originating through biological sources of agricultural, plantation, forestry, fishery, animal husbandry, aquatic materials, with either processed or unprocessed water [20].

Food additives (BTP) or what is usually abbreviated as BTP are products that are included and mixed when food processing in improving the quality of food products [2]. In general, the use of

food additives is often used with the aim of protecting the product from microbiological damage. However, it turns out that there are also many who intentionally use food additives (BTP) for certain purposes with materials that are not permitted or prohibited [9].

Basically food additives (BTP) can be divided into two parts, namely intentional additives and unintentional additives. Deliberate additives are additive products that are intentionally given for this purpose, such as in increasing consistency, nutritional value, taste, controlling acidity and wetness, as well as stabilizing shape and appearance, but unintentional additives are additive compounds that are not intentionally added and the presence of in small amounts of food resulting from the processing process [9].

Borax is a substance that forms white crystals, has no odor, and is stable at room temperature. Borax is a chemical substance in the naming of sodium tetraborate with its chemical formula Na2B4O7 10 H2O, which when dissolved in water can form hydroxide reactions with boric acid (H3BO3) [15].

Borax is also one of the dangerous and toxic products that cannot be used for food additives (BTP) and its use is prohibited by the government by being added to the group of B3 substances or dangerous and toxic products [11].

Borax as well as what is usually called boric acid, sodium tetra borax and sodium borate actually have uses as cleaning agents, fungicides, herbicides, with insecticides that are toxic or toxic to humans [15]. Although not a food preservative, borax is always used for preservation by thickening foods. In the area's residents, borax is also known in naming bleng salt, as well as pijer which is used in preserving rice in the formation of foods called legendary and gendar [15].

Formalin or commonly called formaldehyde is a chemical substance that forms a gas with a more pungent 15% aroma for preservation with stabilizers. Formaldehyde forming a powder or solid is called paraformaldehyde. Formaline with paraformaldehyde can release formaldehyde gas. Formladehide in the form of a solution is generally used in the preservation of biological specimens. formaldehyde has the molecular formula CH2O and has other names which are formole, methylene aldehyde, paraforine, morbicide, oxomethane, polyoxymethylene glycole, methanale, formoform, superlysoform, formic aldehyde, formalite, tetraoxymethylene, methyl oxide, karsane, triosane, oxymethylene glycole with methylene. Formaldehyde has a molar mass of 30.03 g/mol in a melting point of -92°C with a boiling point of -21°C [19].

In liquid form, formaline is a clear, colorless or almost colorless solution that has a pungent odor, its vapors stimulate the mucous membranes of the nose and throat and feel burning. The weight per millimeter is 1.08 grams. Miscible in water with alcohol, but not in chloroform with ether. It dissolves quickly in water due to the presence of lone electrons in oxygen so that it can hold water molecular hydrogen bonding [19].

Formaline has been more commonly used in everyday life. When used properly, formaline can often be used as an antibacterial and for killing germs in several types of industrial needs, namely cleaning floors, ships, warehouses with clothes, exterminating flies or other insects. In the world of photography, it is generally used for gelatine coating hardening products with paper [19].

Formaline is also always used for perfume formation products, preservation of cosmetic ingredients, nail hardening with products in foam insulation. Formaline can also be used to treat corrosion in oil wells. In the wood

industry, formaline is used as an adhesive in plywood products [19]. The magnitude of the benefits of formalin in the industrial sector turned out to be misused for the preservation of the food industry. Usually this is often found in home industries because they are not registered and are not monitored by the Ministry of Health and the local Food and Drug Supervisory Agency (BPOM). Even foods that are preserved with formalin are usually wet noodles, tofu, meatballs, salted fish, and several other foods. Formalin is often misused because the price is very cheap and easy to obtain [19].

Formaline is also used for chemical reactions that can take the form of polymer bonds that can produce very bright colors. Therefore, formaline is also often used in household materials such as plates, glasses, with bowls that come from plastic or melamine. When plates or glasses are exposed to hot food or drinks, the formalin products in the glass can be dissolved [19]. Borax and formalin are substances or materials that cannot be used for food additives (BTP). Borax has a carcinogenic effect that causes abnormalities in the brain, liver, and kidneys accompanied by danger in the preparation of the central nervous system. While formalin can cause irritation and burning in the mucous membranes, mouth with acute respiratory tract irritation such as irritation of the mouth, esophagus, ulcers in the digestive tract, chest pain with stomach, nausea, vomiting, diarrhea, gastrointestinal bleeding, metabolic acidosis, kidney failure and even death. [11].

Based on the results of observations carried out by the Food and Drug Administration (BPOM) in November 2009 to the end of January 2010 in a sampling test on school food snacks in 6 provincial capitals on the island of Java on five snacks, namely meatballs, sauce syrup, noodles, and crackers, when producing crackers containing rhodamine B, sauce containing methanile yellow, meatballs containing borax, and noodles containing formaline [2].

Observations carried out by the Food and Drug Administration (BPOM) in Gorontalo in 2015 showed that 15% of positive food products contained harmful products, namely borax, formaline, rhodamine B, with methane yellow [3].

The food, hazardous materials and mycorrhology laboratory at the Food and Drug Monitoring Agency (BPOM) in 2017 also carried out testing using a mobile laboratory car (mobling) for 412 samples, with the results of 408 samples complying with the requirements (MS) and 4 samples not meeting the requirements. (TMS) is borax [4].

In 2019 the Food and Drug Monitoring Agency (BPOM) again carried out formalin and borax tests carried out at various markets in the city of Gorontalo, getting the results of 14 positive wet noodles containing formalin and 3 positive wet noodles containing borax [5].

Regulation of the Minister of Health No.033 of 2012 concerning the grouping of food additives or abbreviated as BTP which is common in food based on its function consists of 12, namely as follows: Coloring, is food additives (BTP) that can change and can also give color to food . For example, Sisnetik staining includes Amaranthe, Indigotine, with nafhtole yellow [14].

Artificial sweeteners are food additives (BTP) that can cause a sweet taste in foods that do not or have almost no nutritional value. For example the saccharide, cyclamate, with aspartame. Preservation, is a food additive (BTP) that can overcome or prevent the formation of fermentation, acidification and other decomposition in food caused by microbial life. For example acetic acid, propionic acid, with benzoic acid [14].

Antioxidants are food additives (BTP) that can prevent or overcome the stages of

fat oxidation to inhibit the formation of rancidity. For example Tertiary butyl hydroquinione (TBHQ). Anti-caking agent, is a food additive (BTP) that can overcome the clumping of food to form powder, flour, or powder. For example potassium silicate. Flavor and aroma enhancement, flavor strengthening, are food additives (BTP) that can produce additions or emphasize flavors and aromas. For example Monosodium Gutamate (MSG) [14].

Acidity regulation (acidification with neutralization) is a food additive (BTP) that can acidify, neutralize and maintain the acidity of food. For example agar, algimate, lecithin, with gume. Bleaching and maturation of flour, is a food additive (BTP) that can shorten the formation of the bleaching stage with the maturity of the flour so that it can improve the quality of maturity. For example ascorbic acid, with potassium chromate [14].

Emulsification, stabilization by thickening, is a food additive (BTP) which can facilitate the formation and stability of a homogeneous dispersion system of food. Hardening, is a food additive (BTP) that can harden or overcome the formation of softening in food. For example calcium sulfate, calcium chloride, with calcium glucomate [14].

Sequestrants are food additives (BTP) that can bind metal ions present in food, so that they can strengthen the aroma, color and texture. For example, phosphoric acid, with EDTA (Ethylene Diamine Tetra Acetic Acid). Other food additives (BTP) that are not included in the grouping of food additives (BTP) above. Examples include enzymes, nutritional additives and humectants [14].

There are several laboratory tests for the identification of borax in food, namely as follows: Borax testing using the flame test is a procedure for testing to identify whether food contains borax or does not contain borax. It is called the flame test because the sample used is burned, then the next step the flame color is compared to the original borax flame color. Pure borax powder is burned to obtain a green flame. If the burned sample acquires a green color, the sample that has been tested is determined to be positive for borax [12].

Borax Testing with Curcumin (Tumeric) paper. In this study, a yellow-orange color natural dye was used, which is present in the turmeric plant (Curcuma domestica valet). The substance curcumin is useful as an indicator in the formation of the initial color change from yellow to brown in a pH of around 4.5-9.9 while at a certain pH it can decompose the binding of borax to boric acid by binding to form a rosa colored complex or called a rosasianine chelate or a Borone Cyano complex substance. Curcumin when certain compounds are one of the compounds that are red [13].

Borax testing using AgNO3 solution. In this test is a test using AgNO3 which when the sample tested positive contains borax so that it can get a white silver metaborate precipitate (AgBO2) originally through a more concentrated liquid borax, dissolved either in aqueous ammonia or in acetic acid. In the boiling process, the precipitate uses water and the precipitate is completely hydrolyzed to obtain a brown silver oxide precipitate. Silver oxide brown colored precipitate is one of the results obtained directly through a more dilute liquid [7].

For the formalin content test, which are usually carried out, namely: Test with a formaline test kit composed of formaline I reagent solution with formaline II reagent powder. The stages of examining the laboratory carried out are food samples that have been sorted in an accurate systematic way, then insertion into a beaker with the addition of 1 drop of aquadest followed by homogenizing, by taking 1 ml of solution through the mixture

and adding it to a test tube, dripping 3-5 drops of reagent I liquid. formaline, close the test tube in a cotton swab, add 1 mg of formaline II reagent powder, the test tube is homogenized, left for 5 minutes. See the color change that appears. When the color changes to purple, it means that certain meatballs contain formaline [18].

Test with phenylhydrazine In this test, 3 drops of phenylhydrazine reagent are added to the sample, then 3 drops of sodium hydroxide are added, then 2 drops of sodium nitroproside are added. Then observe the color change that occurs. If there is a green color change, it means that the positive sample contains formalin [18].

KMnO4 Test The function of KMnO4 (Potassium Permanganate) which is used as an oxidizer of formaldehyde in formalin until a decrease in oxidation number is formed which can be a sign of color change in KMnO4 liquid is through a purple color to form clear [17].

Bakso is a typical Indonesian food that is liked by most people. Meatballs include processed meat ingredients that are formed through livestock meat that has been mixed with starch and spices, or not by adding other food products and there is also the addition of food additives (BTP) that have been given permission, these meatballs are usually round in shape. or others and have gone through a maturation process [6].

There are several characteristics of meatballs that contain borax, which are as follows: More chewy than meatballs without borax, Durable or durable in a few days, The color looks whiter than the color of meatballs that do not contain borax, fresh gray evenly in all The smell of meatballs containing borax has a characteristic chemical smell, while the odor of meatballs that do not contain borax has a more natural smell [7].

There are several characteristics of meatballs that contain formalin, namely as follows: Does not spoil up to 5 days at room temperature (25 ° C), The texture is very chewy and is not infested with flies, The texture of the meatballs is sticky, The color of the meatballs looks white [18].

Wet noodles are noodles that are not processed (cooked) in the highest water content, but dry noodles have the lowest water content. The stages of noodle formation include the stages of product mixing, kneading until smooth, forming strands, as well as cutting based on size [7].

There are several characteristics of noodles that contain borax, namely: the texture of the noodles is chewy and not easily broken, looks shiny, the texture of the noodles is not sticky [12]. And there are also some characteristics of noodles that contain formalin, which are as follows: The smell of formaline is quite pungent, it is not swarmed by flies, the texture of the noodles is very sticky [12].

Based on a literature study conducted by researchers with the problems that have been described, it makes observers interested in carrying out these observations, namely the identification of borax with formaline in meatballs with wet noodles in Gorontalo City. And the procedure used in these observations is a simple procedure, namely using turmeric extract (curcumin solution) to identify the content of borax and potassium permanganate (KMnO4) to detect Formalin.

RESEARCH METHODS

The type of observation in this observation uses a descriptive type of observation in qualitative proximity, which aims to determine whether or not there is borax and formalin content in meatballs and wet noodles sold in Gorontalo City.

The observation was carried out in the period August 2021 at the Chemistry Laboratory of the Bina Mandiri University, Gorontalo. And for the location of sample

collection for these observations, Gorontalo City.

In this observation, the type of data used is primary data with secondary data. Primary data in this study were obtained in carrying out laboratory testing on predetermined samples, namely meatballs and wet noodles sold in Gorontalo City and their documentation. While secondary data was obtained from literature data and government policies on food additives (BTP), annual data from BPOM Gorontalo. And the source of data in this research is obtained by conducting laboratory tests and documentation results.

In these observations, the sampling technique was carried out using purposive sampling technique, which is a data sampling technique in considering or the criteria that must be met in the sample to be used for research where the criteria are made by the observer, in accordance with the characteristics of the population that have been determined. earlier. with the number of samples as many as 27 samples of which 20 samples were meatball samples and 7 samples of wet noodles.

The data collection technique is by conducting research directly in the laboratory, then after the results are obtained, the data is presented in tabular form and then narrated in reviewing the presence or absence of borax and formalin in meatballs and wet noodles sold in Gorontalo City. If a sample containing borax with formaline is found, the next step is to calculate the number of presentation frequencies using the following formulas:

$$P = \frac{f}{N} \times 100$$

Description :

P : Percentage

F : Frequency or number of samples that are positive for borax/formalin

n :Total number of samples examined

The data processing method is through several stages, namely Editing (editing, Coding, Tabulating, Cleaning data), and Descrbing data.

In these observations, the validity of the data was used, namely in laboratory tests using qualitative methods by looking at the color comparison of the positive control with the sample. The color changes that occur in the borax content test, i.e. if the positive sample contains borax, a yellow to brown change occurs, and the formalin content test, i.e. if the sample is positive, the purple color change forms a clear color.

RESEARCH RESULT

Based on the results of research conducted in August 2021 at the Chemical Laboratory of Bina Mandiri University, Gorontalo regarding the Identification of Borax and Formalin in Meatballs and Wet Noodles in Gorontalo City. there is borax content in the meatball sample, the results are as follows:

1. Samples of meatballs

Table 1. Borax and Formalin Examination Results on Meatball samples

No	Code Sample	Meatball test result		Discoloration	
		Borax	Formalin	Borax	Formalin
1	A1	Negative	Positive	Yellow	Clear
2	A2	Negative	Positive	Yellow	Clear
3	A3	Negative	Positive	Yellow	Clear
4	R1	Negative	Positive	Yellow	Clear
5	R2	Negative	Positive	Yellow	Clear
6	R3	Negative	Positive	Yellow	Clear
7	S1	Negative	Positive	Yellow	Clear
8	S2	Negative	Positive	Yellow	Clear
9	S3	Negative	Positive	Yellow	Clear
10	S4	Negative	Positive	Yellow	Clear
11	S5	Negative	Positive	Yellow	Clear
12	ST 1	Negative	Positive	Yellow	Clear
13	ST 2	Negative	Positive	Yellow	Clear
14	ST 3	Negative	Positive	Yellow	Clear
15	ST 4	Negative	Positive	Yellow	Clear
16	ST 5	Negative	Positive	Yellow	Clear
17	ST 6	Negative	Negative	Yellow	Purple
18	ST 7	Negative	Negative	Yellow	Purple
19	ST 8	Negative	Negative	Yellow	Purple
20	ST 9	Negative	Negative	Yellow	Purple

(Source: August primary data)

Description Sample code:

A1-A3 =Meatball stall in Dungingi District
R1-R3 =Meatball eating meatballs in District
S1-S3 =Meatball restaurant in South City District
S4-S5 =Meatball stall in Dumbo Raya District
ST3-ST6 =Food stall in North City District
ST1, ST2, ST7,
ST8, ST9 =Meatball restaurant in City District

Based on table 1, it shows that the borax content of the 20 samples studied was negative, which means that there was no borax content in the meatball sample. This is indicated by the absence of a color change from yellow to brown on the curcumin (tumeric) paper on each curcumin (tumeric) paper. The purple color became clear in the test tube which had been added with the sample and 0.1 N KMnO4 (potassium permanganate) solution.

2. Wet Noodle Sample

Table 2. Results of Borax and Formalin Examination on wet noodle samples

No	Code Sample	Meatball test result		Discoloration	
		Borax	Formalin	Borax	Formalin
1	P1	Positive	Positive	Chocolate	Clear
2	P2	Positive	Positive	Chocolate	Clear
3	P3	Positive	Positive	Chocolate	Clear
4	P4	Negative	Negative	Yellow	Purple
5	P5	Positive	Positive	Chocolate	Purple
6	P6	Positive	Positive	Chocolate	Clear
7	P7	Positive	Positive	Chocolate	Clear

(Source: Primary data August 2021

Sample Code Description:

P1 - P2 = Wet Noodles at Moodu market
P3 - P4 = Wet Noodles in the Central market
P5- P6 = Wet Noodles at Dungingi market
P7 = Wet Noodles at Lilowo market

Based on table 2 shows that, for the borax content of 7 samples of wet noodles, there were 6 positive samples, which means that there were 6 samples of wet noodles containing borax. this is indicated by a change in color from yellow to brown on the curcumin paper (tumeric) on each curcumin paper (tumeric) to which the sample has been added. and for the formalin content among 7 samples of wet noodles, 4 of them were positive for formalin, this was indicated by a change in color from purple to clear in the test tube which had been added to the sample and 0.1 N KMnO4 (potassium permanganate) solution.

DISCUSSION

In accordance with the observations made by observers from a total of 27 samples where for the 20 samples of meatball samples and 7 samples of wet noodles, the results for the examination of meatballs among 20 samples that were tested negative did not contain borax and there were 5 positive samples contained formaline. As for the examination in the sample of wet noodles, 7 samples were examined, 6 of them were positive for borax and 5 of them were positive for formalin.

This study aims to identify the content of borax and formalin in meatballs and wet noodles in the city of Gorontalo by using a simple method, namely the curcumin paper method (tumeric) in identifying the borax content by observing the color change on the curcumin paper (tumeric) from yellow to brown and the method KMnO4 0.1 N (potassium permanganate) by looking at the color change in the reaction that occurred from purple to clear.

In these observations, the validity of the data used is in laboratory tests using qualitative methods by looking at the comparison of the color of the positive control with the sample used. As for the color changes that occur in the borax

content test, if the sample is positive it contains borax then the yellow color changes to brown, but in the formalin content test, if the sample is positive, there is a purple color change to form a clear color.

Food additives or what is usually abbreviated as BTP are products or mixing products in a natural way, not including parts through food raw products, but the addition of food conditions in influencing the nature and formation of food, including coloring products, preservation, flavoring, anti-clotting, bleaching with coagulation. Food additives (BTP) are also defined as products that are included and mixed in during food processing to improve the quality of food products [2].

Borax and formalin are substances or materials that cannot be used for food additives (BTP). Borax has a carcinogenic effect that causes abnormalities in the brain, liver, and kidneys and is harmful to the central nervous system. While formalin can cause irritation with a burning sensation in the mucous membranes, mouth and acute respiratory tract such as irritation of the mouth, esophagus, ulcers in the digestive tract, chest pain with stomach, nausea, vomiting, diarrhea, gastrointestinal bleeding, metabolic acidosis, kidney failure and even death. [11].

Other negative effects given by borax for humans that can still be tolerated include decreased appetite, digestive system disorders, respiratory disorders, mild central nervous system disorders such as easily confused, anemia, and hair loss. But when the toxic dose has reached or has passed the maximum limit so that it can cause fatal effects, starting with vomiting, diarrhea, shortness of breath, stomach cramps with pain in the upper abdomen, nausea, weakness, gastroenteritis bleeding along with vomiting blood and headaches great [11].

As for Formalin, it can cause irritation with a burning feeling in the mucosa of the nasal cavity, mouth and upper respiratory tract when entered by inhalation. When swallowed at the highest strength produces acute symptoms such as irritation of the mouth, esophagus, ulcers in the gastrointestinal tract, chest pain with stomach, nausea, vomiting, diarrhea, gastrointestinal bleeding, metabolic acidosis, renal failure and even death [11].

Vapors produced by formalin in the form of a solution in direct contact with the skin can cause pain, white discoloration, hard, with first-degree burns to the skin. Dermal sensation with signs of eczema, concomitant versicular reactions in eruptions in the eyelids, face, neck , scrotum, also shoulder [11].

Based on the toxicity caused by borax and formalin described above, for example in kidney disorders as an ATLM (Medical Laboratory Technology Expert) kidney function tests can be carried out, one of which is a urine test or urinalysis. , bacteria, and glucose in the urine.

In the examination of the identification of borax in food, there are several tests that can be carried out, one of which is the curcumin paper test (tumeric) where the principle in this examination is that curcumin is useful as an indicator of the formation of the initial color change from yellow to brown in a pH of around 4.5 - 9, 9 can also be broken down in borax bonds to form boric acid by binding to form a rosa color complex or the so-called rosasianine chelates and borone complex substances.

In the formalin examination there are also several tests that can be carried out, one of which is the 0.1 N $KMnO_4$ test (potassium permanganate) where the principle of the examination is as an oxidizer of formaldehyde in formalin so that there is a decrease in the oxidation number that can be seen in the sample being examined which is marked by a

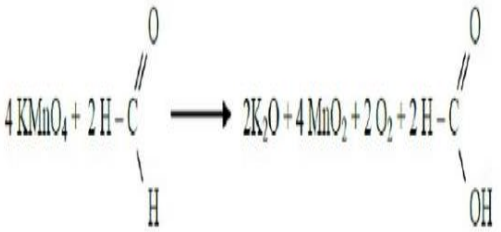
change in color. in a solution of KMnO4 (potassium permanganate) from purple to clear. This indicates that the sample under study is positive for formalin.

Based on the research on the identification of borax in the meatball samples from 20 samples that have been examined, the negative results do not contain borax with a percentage value of 0%. The curcumin solution used can break down the borax bonds into boric acid and bind them to the Boron Cyano curcumin complex, which is red in color. This color change did not occur in this study, meaning that the sample did not contain borax. and identification of borax for samples of wet noodles from 7 samples that have been examined, the results obtained 6 positive samples containing borax and 1 negative sample not containing borax with a percentage value of 85.71% [8].

This is in accordance with identifying borax in meatballs in Moodu Village, Kota Timur District, Gorontalo City using the curcumin paper method (tumeric) with a sample number of 7 samples examined with the results of all samples being tested negative, which is evidenced by the meatballs sold in Moodu Village, Kota Subdistrict. East Gorontalo City is free from prohibited preservation products such as borax until certain meatballs are safe to consume so that we avoid side effects that occur when consumed for a long time [10].

The results of the reactions that occur in samples containing Borax can be seen in the following figure:

Figure 1 Reaction of borax and curcumin



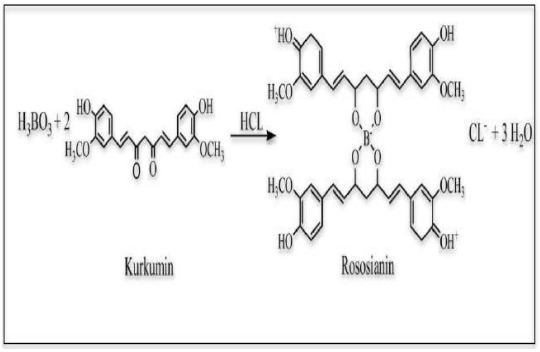
(Source: Fajriana, 2016)

Meanwhile, in the study of formalin identification in meatball samples from 20 samples that had been examined, 16 of them were positive containing formaline and 4 negative were not containing formaline with a percentage value of 80%. and for samples of wet noodles from 7 samples that have been examined, the results obtained are 5 samples which were tested positive for containing formaline with 2 negative samples not containing formaline with a value of 71.42% percentage.

In the formalin test, the positive sample changes color from purple to faded or clear in the sample being tested and in the negative sample there is no color change or remains purple in the sample being tested. in the observation title "Boraxs and Formalin Analysis in the Shumai Treated in Palu City" the results show that in a sample it is declared positive for formalin if there is a color change in the sample tested, the color changes from dark purple or bright purple to a clear color [11] .

The results of the reactions that occur in the samples examined containing Formalin can be seen in the figure as follows:

Figure 2. Formalin and PotassiumReaction permanganate



(Source: Ayuchecaria et al, 2017)

Identification of the content of borax with formaline in meatballs in Limboto District, Gorontalo Regency obtained results from 33 samples of meatballs that had not been found to contain borax but in

the examination of formalin content there were 25 positive for formalin with 8 negative for no formaldehyde [21].

CONCLUSION

In accordance with the observational data carried out, conclusions can be drawn from the total sample of meatballs, namely 20 samples, 20 negative Borax and 16 positive Formalin, while for the wet noodle sample with 7 samples, 6 positive Borax and 5 positive Formalin.

BIBLIOGRAPHY

[1] Ayuchecaria, N, Anna, K. Elisya, F. 2017. "Qualitative analysis of formalin on chickens sold in the old market in Banjarmasin area". ISFI Academy of Pharmacy Banjarmasin : Banjarmasin.

[2] Drug and Food Control Agency. 2013. "The Food and Drug Supervisory Agency of the Republic of Indonesia Number 36 of 2013 concerning the Maximum Limit for the Use of Food Additives Preservatives" : Jakarta.

[3] Drug and Food Control Agency. 2015. “2015 annual report”. BPOM : Gorontalo.

[4] Drug and Food Control Agency. 2017. “2017 annual report”. BPOM : Gorontalo.

[5] Drug and Food Control Agency. 2019. “2019 annual report”. BPOM : Gorontalo.

[6] National Standardization Body. 2014. “Meatballs”. Manggala Wanabakti National Standardization Agency : Jakarta.

[7] Efrilia, M. Tria, P. Nur, M. 2016. "Identification of Borax in Meatballs in Happy Village, North Bekasi, West Java with Qualitative Analysis Method". IKIFA Pharmacy Academy : Bekasi.

[8] Harahap, AL 2019. "Identification of Borax in Meatballs Sold on Jalan HM Yamin Medan". Health Polytechnic : Medan.

[9] Langi, T. & Yoakhim, YEO 2019. “Teaching Books for Food Additives Courses”. Sam Ratulangi University : Manado.

[10] Lestari, NI & Misnati. 2018. "Identification of Borax Content in Meatballs in Moodu Village, Kota Timur District, Gorontalo City". Gorontalo Health Polytechnic : Gorontalo.

[11] Milehman, A. & Mery, N. 2020."Boraxs and Formalin Analysis in the Shumai Treated in Palu City". Tadulako University : Palu.

[12] Nurhasana, 2017 "Identification of the Use of Borax in Wet Noodles Sold by Dumpling Traders in Kendari City". Kendari Health Polytechnic : Kendari.

[13] Nurma. 2017. "A Study of Borax Analysis Using Curcumin from Turmeric Rhizome Extract (Curcuma Domestica Val.) Using Ultraviolet-Visible Spectrophotometry. Thesis". University of Lampung: Lampung.

[14] Regulation of the Minister of Health of the Republic of Indonesia Number 033 of 2012. “Food Additives. 2012". State Secretariat : Jakarta.

[15] Pudjirahayu, A. 2017. “Food Quality Control”. Health Human Resources Education : Ministry of Health RI.

[16] Siahaan, RF 2017. "Controlling Family Health Through Selection and Proper Food Processing". Medan State University: Medan.

[17] Sikanna, R. 2016. "Qualitative Analysis of Formalin Content in Tofu Sold in Several Markets in Palu City". Tadulako University : Palu.

[18] Suhada, 2017 "Identification of Formalin Content in Meatballs Circulating in Six Traditional Markets in Bandar Lampung". Raden Intan State Islamic University : Lampung.

[19] Turnip, ED 2018. "Identification and Determination of Formalin Levels in Wet Noodles and Identification of Borax in Meatballs". University of North Sumatra : Medan.
[20] *Law of the Republic of Indonesia Number 36 Year 2009 concerning Health*. 2009. Central government : Jakarta.
[21] *Law of the Republic of Indonesia Number 18 of 2012 concerning Food*. 2009. Central government : Jakarta.
[22] Yandri, A. Siswatiana, R. Muhammad, S. 2017. "Qualitative Test of Borax and Formalin on Meatballs sold in Limboto District, Gorontalo Regency". Faculty of Agriculture : State University of Gorontalo.