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Identification of borax and formaldehyde content in meatballs traded in Mandonga Wet Market and Lawata Market, Kendari City in 2024

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Abstract

Bakso is one of the traditional processed meat products that is very popular and favored by all levels of society. The use of BTP in food is done because BTP can maintain or improve the quality of shelf life. Borax and formaldehyde include abuse of hazardous materials that are often used as BTP because both can cause health problems in humans. This study aims to determine the content and levels of borax and formaldehyde preservatives found in meatballs circulating in Mandonga Wet Market and Lawata Market, Kendari City. The sampling method used in this study was total sampling. Samples were analyzed qualitatively using Test-Kit and quantitatively using Uv-Vis Spectrophotometry. The results showed that out of 40 samples of meatballs traded in Mandonga Wet Market and Lawata Market in Kendari City, 2 samples (Mandonga Wet Market) contained borax, namely sample X2-Y1-9 with levels of 8.39 mg/g and X2-Y1-10 with levels of 10.73 mg/g and 3 samples (Lawata Market) contained formalin, namely sample X1Y2-5 with levels of 17.09 mg/g, X1Y2-9 with levels of 18.92 mg/g, and X1Y2-10 with levels of 20.99 mg/g.

Keywords: Meatballs; Borax; Formalin; Test-Kit; Spektrofotometri UV-Vis

1. Introduction

Food is one of the important sources for human survival and is a basic human need that must be met in order to maintain health, improve intelligence and work productivity. Therefore, good quality food must be highly nutritious, have a delicious taste, be attractive, clean and not harmful to the body for which a good organization system is needed. According to the Indonesian Government Regulation No. 86 of 2019 concerning Food Safety, Food Additives (BTP) are materials added to food to affect the nature or form of food. The use of BTP in food is done because BTP can maintain or improve the quality of shelf life, make food easier to serve and facilitate the preparation of food. The misuse of hazardous materials prohibited for food such as borax, formalin, textile dyes and the use of BTP exceeding the maximum permitted limit are problems that are often encountered in the community (1).

Borax and formaldehyde are hazardous substances that are often used as BTP because both can cause health problems in humans. Borax and formaldehyde are commonly used in meat products such as meatballs. Not only meatballs, borax and formaldehyde are also often misused in other food products such as noodles, nuggets and sausages. Borax is a chemical compound derived from heavy metal boron (B) which is usually used as an anti-mold ingredient, for wood preservatives, in industry it is often used for metal brazing, wood preservatives, and cockroach repellents and as an antiseptic in cosmetic products. Borax is often used by traders who want more profit in producing food because the price is cheap and preservation using borax can make food can be stored for days, even months, so that traders can get greater profits. Formalin is a colorless solution and the smell is very penetrating. Formalin is widely used for food preservatives such as meatballs, sausages, and crackers. Formalin is also a chemical that is widely used in everyday life. The most popular use of formalin is as a preservative for corpses and research animals. This chemical is also widely used in industry, as a pest killer (disinfectant), antiseptic substance to kill viruses, bacteria, and fungi. In addition,

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formalin with a concentration of <1% is widely used as a preservative for dishwashing liquid, softeners, car shampoos, candles and carpets (2).

The characteristics of meatballs containing borax are that the smell is not natural or there is another odor that appears, when thrown on the floor it will bounce like a bekel ball, chewier than meatballs in general and if pressed it will be slightly harder than meatballs that do not contain borax. Meanwhile, meatballs containing formalin have characteristics including a paler color than meatballs that do not contain formalin but the inside of the meatball is redder, the distinctive aroma of meatballs is not strong, the meatballs are chewier, have a longer shelf life, are not sticky, and are not infested with flies (3).

According to WHO data, around 600 million people or 1 in 10 people in the world experience certain diseases caused by the consumption of unsafe food/contaminated with bacteria, viruses, parasites and hazardous chemicals and result in 420,000 people dying each year. The World Bank's 2019 report on the economic burden of foodborne illness states that there is a reduction in labor productivity due to foodborne illness of US$ 95.2 billion per year and the annual cost of treating foodborne illness is estimated at US$ 15 billion (4).

Data from the Food and Drug Administration of the Republic of Indonesia (BPOM RI) in 2020 shows that there are still food snacks containing borax, namely 67 (58%) in gendar crackers, tempeh crackers, chocolate crackers, spring roll skins, rambak crackers, bleng, banana chips, macaroni. Apart from borax, formalin is also still found in food snacks. The misuse of hazardous materials that are often used as BTP found in food is rhodamine B, namely as many as 24 (21%) in red sago ambon, red crackers, pink cones, red candil, Chinese girlfriend, melarat crackers (5).

The results of the 2021 Annual Report of the Southeast Sulawesi BPOM Laboratory Inspection in Kendari City found that several samples contained hazardous substances in food samples, each sample studied amounted to 2 samples, including shredded fish identified as containing formalin 1 sample and shrimp paste identified as containing rhodamine B 1 sample. Then in 2022, several samples were found to contain formaldehyde and borax, each sample studied amounted to 3, including, cowhide crackers identified as containing formaldehyde in 1 sample, shredded fish identified as containing formaldehyde in 1 sample, and siomay identified as containing borax in 1 sample. The active role of BPOM in carrying out laboratory examinations of the use of borax-type food additives is carried out annually in each location of Kendari City (6).

According to BPOM 2020 a number of traders such as meatballs use a type of food preservative, one of which is borax in Kendari City, although the percentage of cases is low according to laboratory test results, it remains a risk factor that tends to continue to increase. In 2022, a study of formalin content in meatballs traded in Wua-Wua Market and Wua-Wua Central Market in Kendari City found that 6 out of 8 samples were positive for formalin with the lowest level being 0.2% and the highest content being 3.6% (7).

Bakso is one of the traditional processed meat products that is very popular and favored by all levels of society and can be expected as a nutritious food source. The reasons that arise underlying this are because meatballs are still economically affordable, savory and easy to obtain. This research is expected to provide information on whether meatball products traded in Mandonga Wet Market and Lawata Market in Kendari City are safe for consumption or not and can provide guidance on how meatball products contain borax and formalin.

2. Material and methods

This research is a type of descriptive qualitative and descriptive quantitative research, the research location is in the Mandonga Wet Market and Lawata Market areas, Kendari City. At the time this research will be carried out in January 2024, the population in this study are all meatball sellers in the Mandonga Wet Market and Lawata Market areas of Kendari City. Based on a survey of the number of dumpling sellers, there are 10 meatball sellers in the Mandonga Wet Market area and 10 meatball sellers in the Lawata Market area. The sampling technique is total sampling where the number of samples is equal to the population. The analysis in this study is a descriptive analysis of the results of laboratory tests on the content of borax and formalin in meatballs and Uv-Vis spectrophotometric tests to determine the levels of borax and formalin in meatballs.

3. Results

3.1. Qualitative Test Results of Borax and Formalin

Table 1 Test Results of Borax Content in Meatballs Traded in Mandonga Wet Market and Lawata Market, Kendari City

No.	Sampling Place	Sample Code	Inspection Parameters	Results	Color Change
1.	Mandonga Wet Market	X_2Y_1-1	Borax	Negative (-)	Unchanged
2.	Mandonga Wet Market	X_2Y_1-2	Borax	Negative (-)	Unchanged
3.	Mandonga Wet Market	X_2Y_1-3	Borax	Negative (-)	Unchanged
4.	Mandonga Wet Market	X_2Y_1-4	Borax	Negative (-)	Unchanged
5.	Mandonga Wet Market	X_2Y_1-5	Borax	Negative (-)	Unchanged
6.	Mandonga Wet Market	X_2Y_1-6	Borax	Negative (-)	Unchanged
7.	Mandonga Wet Market	X_2Y_1-7	Borax	Negative (-)	Unchanged
8.	Mandonga Wet Market	X_2Y_1-8	Borax	Negative (-)	Unchanged
9.	Mandonga Wet Market	X_2Y_1-9	Borax	Positive (+)	Red
10.	Mandonga Wet Market	X_2Y_1-10	Borax	Positive (+)	Red
11.	Lawata Market	X_2Y_2-1	Borax	Negative (-)	Unchanged
12.	Lawata Market	X_2Y_2-2	Borax	Negative (-)	Unchanged
13.	Lawata Market	X_2Y_2-3	Borax	Negative (-)	Unchanged
14.	Lawata Market	X_2Y_2-4	Borax	Negative (-)	Unchanged
15.	Lawata Market	X_2Y_2-5	Borax	Negative (-)	Unchanged
16.	Lawata Market	X_2Y_2-6	Borax	Negative (-)	Unchanged
17.	Lawata Market	X_2Y_2-7	Borax	Negative (-)	Unchanged
18.	Lawata Market	X_2Y_2-8	Borax	Negative (-)	Unchanged
19.	Lawata Market	X_2Y_2-9	Borax	Negative (-)	Unchanged
20.	Lawata Market	X_2Y_2-10	Borax	Negative (-)	Unchanged

Resource: Primary data, 2024

Table 1 shows that of the 20 meatball samples studied, 18 were negative and 2 were positive for borax as indicated by the color change of the borax paper to red to dark red.

Table 2 Test Results of Formalin Content in Meatballs Traded in Mandonga Wet Market and Lawata Market, Kendari City

No.	Sampling Place	Sample Code	Inspection Parameters	Results	Color Change
1.	Mandonga Wet Market	X_1Y_1-1	Formalin	Negative (-)	Unchanged
2.	Mandonga Wet Market	X_1Y_1-2	Formalin	Negative (-)	Unchanged
3.	Mandonga Wet Market	X_1Y_1-3	Formalin	Negative (-)	Unchanged
4.	Mandonga Wet Market	X_1Y_1-4	Formalin	Negative (-)	Unchanged
5.	Mandonga Wet Market	X_1Y_1-5	Formalin	Negative (-)	Unchanged
6.	Mandonga Wet Market	X_1Y_1-6	Formalin	Negative (-)	Unchanged
7.	Mandonga Wet Market	X_1Y_1-7	Formalin	Negative (-)	Unchanged
8.	Mandonga Wet Market	X_1Y_1-8	Formalin	Negative (-)	Unchanged
9.	Mandonga Wet Market	X_1Y_1-9	Formalin	Negative (-)	Unchanged
10.	Mandonga Wet Market	X_1Y_1-10	Formalin	Negative (-)	Unchanged
11.	Lawata Market	X_1Y_2-1	Formalin	Negative (-)	Unchanged
12.	Lawata Market	X_1Y_2-2	Formalin	Negative (-)	Unchanged
13.	Lawata Market	X_1Y_2-3	Formalin	Negative (-)	Unchanged
14.	Lawata Market	X_1Y_2-4	Formalin	Negative (-)	Unchanged
15.	Lawata Market	X_1Y_2-5	Formalin	Positive (+)	Purple
16.	Lawata Market	X_1Y_2-6	Formalin	Negative (-)	Unchanged
17.	Lawata Market	X_1Y_2-7	Formalin	Negative (-)	Unchanged
18.	Lawata Market	X_1Y_2-8	Formalin	Negative (-)	Unchanged
19.	Lawata Market	X_1Y_2-9	Formalin	Positive (+)	Purple
20.	Lawata Market	X_1Y_2-10	Formalin	Positive (+)	Purple

Resource: Primary data, 2024

Table 2 shows that of the 20 meatball samples studied, 17 samples were negative and 3 samples were positive for formaldehyde as indicated by the color change in the sample to purple..

3.2. Quantitative Test Results of Borax and Formalin

3.2.1. Borax Quantitative Test Results

Samples that tested positive in the qualitative test were followed by quantitative testing using Uv-Vis spectrophotometry to determine the level of borax or boron. Before testing formalin levels, it is necessary to determine the maximum wavelength and determine the standard curve for borax.

Determination of Maximum Wavelength

The results of wavelength measurements using Uv-Vis spectrophotometry carried out were that the maximum absorption of the borax test solution compound occurred at a wavelength of 428 nm with a maximum absorbance of 0.255. In this study, it is concluded that the next concentration measurement can be measured at a wavelength of 428 nm.

Determination of Borax Standard Curve

Preparation of a standard curve is done to determine the relationship between concentration and absrobasni produced by the standard solution. The regression equation obtained from the standard reading of borax of various concentrations is y = 0.0118x + 0.1365 with an R2 value of 0.9926. Based on this equation, the borax concentration of

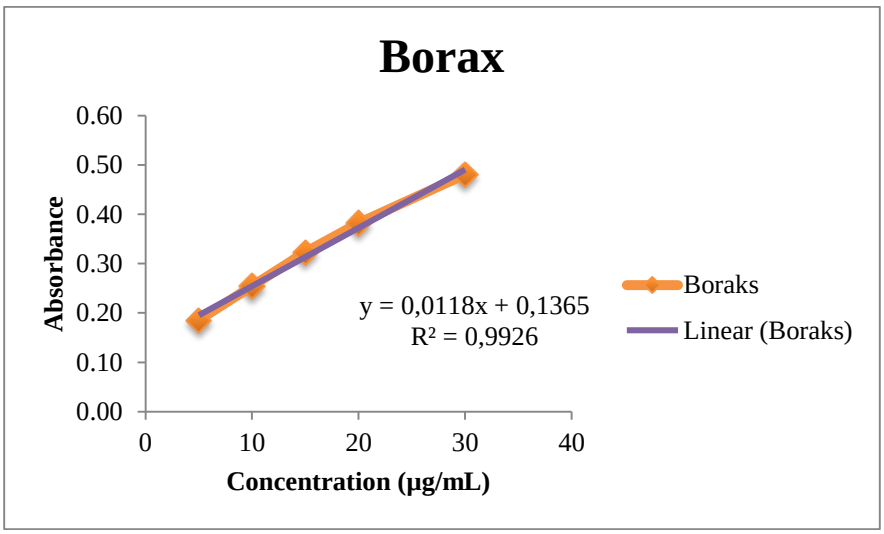
the samples can be identified. The results obtained from the measurement of standard solutions using UV-Vis spectrophotometry can be seen in table 4.

Table 4 Absorbance Value of Standard Solution

No.	Concentration (Mg/L)	Absorbance
1.	4	0.1856
2.	10	0.2546
3.	15	0.3231
4.	20	0.3823
5.	30	0.4806

Resource: Results of Primary Data Analysis in 2024

Table 4 shows that the absorbance measurement results of each borax standard solution are 0.1856, 0.2546, 0.3231, and 0.4806. From the absorbance results of each standard solution, a linear regression curve was made between the concentration and absorbance, so that the regression equation used to determine the sample concentration was obtained. A picture of the borax standard calibration curve can be seen in Figure 1.



Resource: Results of Primary Data Analysis in 2024

Figure 1 Borax Standard Calibration Curve Graph

Figure 1 shows that the results of the standard calibration curve obtained a correlation value R of 0.9926, with y = 0.0118x + 0.1365.

Borax Quantitative Test Results

Table 5 Absorbance Value Data on Samples

Treatment	Repeat Absorbance			Average Absorbance
	I	II	III	
X_2-Y_1-9	0.2356	0.2356	0.2356	0.2356
X_2-Y_1-10	0.2632	0.2632	0.2632	0.2632

Resource: Results of Primary Data Analysis in 2024

Table 5 shows that the average absorbance results on 2 meatballs where the wavelength measurements were carried out with 3 repetitions, namely sample X2-Y1-9 with the lowest average absorbance of 0.2356 and sample X2-Y1-10 with the highest average absorbance of 0.2632. The absorbance is then entered into a linear regression equation that has

been obtained from the relationship between concentration and absorbance in the standard solution so that the concentration of the spectrophotometric device reading is obtained. Based on the results of the standard calibration curve and the absorbance value of each sample to measure the concentration of borax using the formula y = a = bx. The borax concentrations obtained in the meatball samples are as shown in table 6 below:

Table 6 Quantitative Test Result of Borax in Meatballs

Sample Code	Sample Borax Concentration (mg/g)
X_2-Y_1-9	8.39
X_2-Y_1-10	10.73

Resource: Results of Primary Data Analysis in 2024

Table 6 shows that the borax concentration obtained from 2 samples of meatballs that are positive for borax are sample X2-Y1-10 with the highest concentration of 10.73 mg/g and sample X2-Y1-9 with the lowest concentration of 8.39 mg/g.

3.2.2. Formalin Quantitative Test Results

Samples that tested positive in the qualitative test were followed by quantitative testing using Uv-Vis spectrophotometry to determine the formalin content. Before testing formalin levels, it is necessary to determine the maximum wavelength and determine the formalin standard curve.

Determination of Maximum Wavelength

The results of wavelength measurements using Uv-Vis spectrophotometry were that the maximum absorption of the formalin test solution compound occurred at a wavelength of 566.0 nm with a maximum absorbance of 1.0996. In this study, it was concluded that the next concentration measurement can be measured at a wavelength of 566.0 nm.

Determination of Formalin Standard Curve

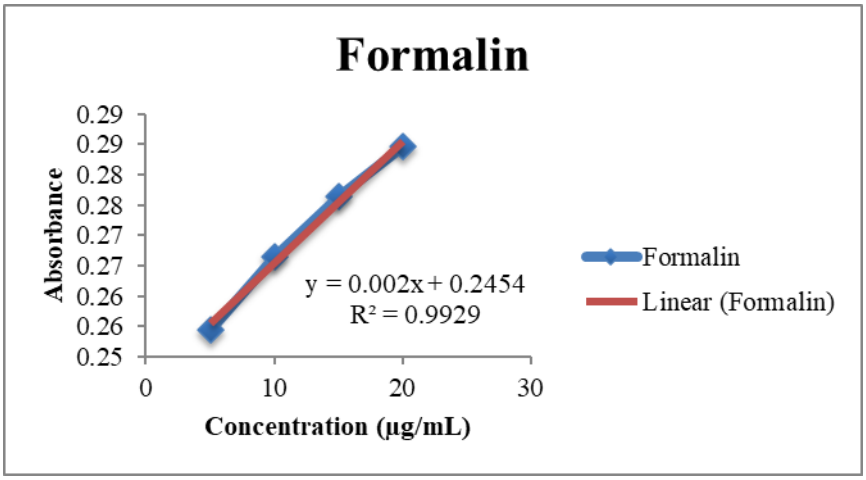
Making a standard curve is done to determine the relationship between concentration and absorbance produced by the standard solution. The standard curve is made from a series of standard solutions that are still within the limits of linearity so that they can be regressedilinearly based on the Lambert-Beer law, namely y = bx + a. The results obtained from the measurement of standard solutions using Uv-Vis spectrophotometry can be seen in the following table 7 below:

Table 7 Absorbance Value of Formalin Standard Solution

No.	Concentration (mg/L)	Absorbance
1.	5	0.2545
2.	10	0.2664
3.	15	0.2765
4.	20	0.2846

Resource: Results of Primary Data Analysis in 2024

Table 7 shows that the absorbance measurement results of each formalin standard solution are 0.2545, 0.2664, 0.2765, and 0.2846. From the absorbance results of each standard solution, a linear regression curve was made between the concentration and absorbance, so that the regression equation used to determine the sample concentration was obtained. A picture of the formalin standard calibration curve can be seen in Figure 2.



Resource: Results of Primary Data Analysis in 2024

Figure 2 Formalin Standard Calibration Curve Chart

Figure 2 shows that the results of the standard calibration curve obtained a correlation value R of 0.9929 with y = 0.002x + 0.2454.

Formalin Quantitative Test Results

Table 8 Absorbance Value Data on Samples

Treatment	Repeat Absorbance			Average Absorbance
	I	II	III	
X_1-Y_2-5	0.2797	0.2797	0.2797	0.2797
X_1-Y_2-9	0.2834	0.2834	0.2834	0.2834
X_1-Y_2-10	0.2875	0.2875	0.2875	0.2875

Resource: Results of Primary Data Analysis in 2024

Based on table 8, the average absorbance results were obtained for 3 meatballs where the wavelength measurements were carried out with 3 repetitions, namely sample X1-Y2-5 with the lowest average absorbance of 0.2797 and sample X1-Y2-10 with the highest average absorbance of 0.2875. The absorbance is then included in the linear regression equation that has been obtained from the relationship between concentration and absorbance in the standard solution, so that the concentration obtained from the spectrophotometric device reading is obtained. ased on the results of the standard calibration curve and the absorbance value of each sample to measure the concentration of formalin using the formula y = bx + a. The formalin concentrations obtained in the meatball samples are as shown in table 9 below:

Table 9 Quantitative Test Results of Formalin in Meatballs

Sample Code	Sample Formalin Concentration (mg/g)
X_1Y_2-5	17,09
X_1Y_2-9	18,92
X_1Y_2-10	20,99

Resource: Results of Primary Data Analysis in 2024

Table 9 shows that the formalin concentration obtained from the 3 meatball samples that were positive for formalin were sample X1Y2-10 with the highest formalin concentration of 20.99 mg/g and sample X1Y2-5 with the lowest formalin concentration of 17.09 mg/g.

4. Discussion

4.1. Qualitative Test of Borax and Formalin in Meatballs

Borax is a chemical compound derived from the heavy metal *Boron* (B), borax is an antiseptic and germ killer. This material is widely used as an anti-mold ingredient, wood preservative and antiseptic in cosmetics. Borax (*Sodium tetrabonate* (NaB4O7 10H2O)) has antiseptic properties which, if consumed over a long period of time, can accumulate in the body, causing poisoning. Borax is one of the hazardous chemicals that is often misused as a preservative in food (8).

Formalin is a solution with a very pungent odor containing 30-50% formaldehyde gas and 10-15% methanol is added to prevent formaldehyde polymerization. Formaldehyde is a highly reactive aldehyde gas formed by incomplete oxidation or combustion of hydrocarbons. In solution, formaldehyde has various uses, namely in the manufacture of resins and textiles, as a disinfectant and as a fixative or laboratory preservative. Formaldehyde (formalin) solution is considered a hazardous compound and its vapors are toxic. Formaldehyde is a carcinogenic substance, which means it can cause cancer (9).

The results of laboratory tests conducted on meatball samples traded in Mandonga Wet Market and Lawata Market in Kendari City identified that there were 2 meatball samples containing borax in Mandonga Wet Market out of 20 meatball samples tested. This is reinforced by the physical characteristics of meatballs containing borax: the smell is not natural or other odors appear, when thrown on the floor it will bounce like a ball, more chewy than meatballs in general and if pressed it will be slightly harder than meatballs that do not contain borax.

The results of laboratory tests conducted on meatball samples sold in Mandonga Wet Market and Lawata Market in Kendari City identified that there were 3 meatball samples containing formaldehyde in Lawata Market out of 20 meatball samples tested. This is reinforced by the physical characteristics of meatballs containing formalin, namely a paler color than meatballs that do not contain formalin but the inside of the meatball is redder, the distinctive aroma of meatballs is not strong, the meatballs are chewier, have a longer shelf life, are not sticky, and are not infested with flies.

This research is in line with previous research conducted by Ode Sitti Zubaydah, Andriani R, Handoyo Sahumena & Irnawati in 2020 on the Preparation of a Test Kit Using Ethanol Extract of Ruruhi Fruit Peel (*Syzygium polycephalum* (*Miq.*) *Merr. & L.M Perry*). As a Detection of Borax Preservatives in Processed Foods which proved positive. What is known from 3 samples of processed food, namely meatballs taken from around the Mandonga area market, there are 2 samples of meatballs that are positive for borax around the Mandonga area market and in line with previous research conducted by Herpin Karimuna & L. Mariani in 2022 on Qualitative and Quantitative Analysis of Formalin Content in Meatballs Traded in the City Central Market and Wua-Wua Central Market in Kendari City which proved positive. It is known from 8 meatball samples taken from 2 Traditional Markets, namely the City Central Market and Wua-Wua Central Market. There were 3 samples of meatballs that were positive for formaldehyde in the City Central Market and 3 samples of meatballs were positive for formaldehyde in the Wua-Wua Central Market. This means that the circulation of meatballs with borax and formalin is still widely found in traditional markets in Kendari City, so it is necessary to carry out regular monitoring to determine the formalin content in meatballs.

4.2. Quantitative Test Results of Borax and Formalin

4.2.1. Quantitative Test of Borax in Meatballs

The borax quantitative test was conducted using Uv-Vis Spectrophotometry. Some things that need to be done in quantitative testing are determining the maximum wavelength that will be used to measure the absorbance of the sample and making a borax standard curve. Determination of the maximum wavelength in this study using sodium tetraborate standard solution measured using Uv-Vis spectrophotometry with a wavelength range of 400-600 nm according to SNI standards. The maximum wavelength of borax was obtained from borax standard solution made with concentrations of 5, 10, 15, 20, 30 mg/L. The wavelength used for sample measurement in this study is 428 nm. This is because at that wavelength the largest absorbance occurs, which is 0.255 absorbance. Based on the measurement results, the absorbance of each broax standard solution is 0.1856 (5 ppm); 0.2546 (10 ppm); 0.3231 (15 ppm); 0.3823 (20 ppm); and 0.3823 (30 ppm) measured at a wavelength of 428 nm. Based on the measurement of formaldehyde levels using Uv-Vis spectrophotometry, the highest borax level was found to be 10.73 mg/g. The borax level in the meatballs exceeded the established threshold.

According to an article published by the Ministry of Environment and Forestry, borax is still safe to consume if 1 kg of food contains only 1 gram of borax. While the fatal dose of borax if accidentally consumed and enters the body for children is 3-6 grams and for adults is 15-20 grams. The rise of public ignorance about the safe limit of borax entering the body, the government issued a regulation on the prohibition of the use of hazardous chemicals as a whole. The ban is contained in the Decree of the Ministry of the Republic of Indonesia No. 722/Menkes/Per/IX/1988 which contains the rule that the use of borax as a food additive is prohibited. This decree is also reinforced by the health minister's regulation No. 1168/Menkes/Per/X/1999 regarding food additives, stating that the use of borax is prohibited in food because it is harmful to the body (10).

This study is in line with previous research conducted by Sari, Nurmansyah, & Supriati (2020) that laboratory tests of borax content in meatballs sold in Muara Bangkahulu District, Bengkulu City were positive for borax with a sample prevalence value of 18.51% and a sample incidence value of 25%. Based on the results of this study, it shows that the quality of meatballs sold in Mandonga Wet Market, Kendari City, not all can be consumed because they still contain food additives that are prohibited from use in food, namely borax.

4.2.2. Quantitative Test of Formalin in Meatballs

The formalin quantitative test was conducted using Uv-Vis Spectrophotometry. Some of the things that need to be done in quantitative testing are determining the maximum wavelength that will be used to measure the absorbance of samples and making a formalin standard curve. Determination of the maximum wavelength in this study uses the Schiff's solution method. The use of Schiff's reagent to provide color so that it can be measured using Uv-Vis Spectrophotometry with a wavelength range of 500-600 nm according to SNI standards. The use of this wavelength range is because the resulting compound is purple in color so that it enters the area in visible light (visible) which is in the wavelength range. From the absorption of these wavelengths, the largest absorbance occurred, namely 1.0996.

Based on the measurement results, the absorbance of each formalin standard solution is 0.2545 (5 ppm); 0.2664 (10 ppm); 0.2765 (15 ppm); and 0.2846 (20 ppm) measured at a wavelength of 566 nm. The results showed each absorbance of the formalin standard solution, the greater the concentration of the standard solution, the greater the absorbance. Based on the measurement of formaldehyde levels using Uv-Vis spectrophotometry, the highest formaldehyde level was found to be 20.99 mg/g. The formaldehyde level in the meatballs exceeded the established threshold.

The International Program on Chemical Safety sets the limit of formalin that can be accepted by the body at 0.1 mg/l (0.1/100 mg/g), while European standards stipulate that humans should not exceed 660 ppm (1000 ppm is equivalent to 1 mg/liter or 1/1000 mg/g). Meanwhile, based on the results of clinical trials, the human body tolerance dose for continuous use (Recommended Dietary Daily Allowances/RDDA) for formalin is 0.2 mg/kg body weight. The high levels of formaldehyde in these samples can endanger health if consumed because it can accumulate in the body and will adversely affect health According to the Regulation of the Minister of Health of the Republic of Indonesia No. 033 of 2012, formalin is an additive that is prohibited from being used in food so that it is not allowed to have even a small amount of formalin in various types of food. However, the use of formalin as a food preservative, especially in meatball products, is still widely found. (11).

This research is in line with previous research conducted by Herpin Karimuna & L. Mariani in 2022 on Qualitative and Quantitative Analysis of Formalin Content in Meatballs Traded in the City Central Market and Wua-Wua Central Market in Kendari City which proved positive. It is known from 8 meatball samples taken from 2 Traditional Markets, namely the City Central Market and Wua-Wua Central Market. There were 3 samples of meatballs that were positive for formaldehyde in the City Central Market and 3 samples of meatballs were positive for formaldehyde in the Wua-Wua Central Market. Based on the results of this study, it shows that the quality of meatballs traded at Lawata Market in Kendari City is not all consumable because they still contain food additives that are prohibited from use in food, namely formalin.

5. Conclusion

The results of laboratory tests related to borax and formalin content in meatballs in Mandonga Wet Market and Lawata Market from 20 samples showed 2 positive meatball samples containing borax in Mandonga Wet Market and 3 positive meatball samples containing formalin in Lawata Market.

A total of 2 samples of meatballs were positive for borax in Mandonga Wet Market with the highest level of 10.73 mg/g and the lowest level of 8.39 mg/g and a total of 3 samples of meatballs were positive for formalin in Lawata Market with the highest level of 20.99 mg/g and the lowest level of 17.09 mg/g.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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