Turmeric Extract Bioindicator in Identification of Borax Compounds in Meatballs

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Abstract

Meatballs are food made from beef, chicken, fish and shrimp, which are popular with people, from children to adults. In managing meatballs, food additives (BTP) are often added which can make the meatballs chewier and last longer, thereby inhibiting the growth of microorganisms caused by the borax content. Borax is a substance that is often used as a preservative and improves the texture of foods such as meatballs, however the use of borax as a food preservative is prohibited in Indonesia because it can cause various diseases such as central nervous disorders and liver problems. This research is to determine whether or not there is Borax in Meatballs that are bought and sold around Praya City, Central Lombok Regency by using a sampling method from 5 meatball stalls, from samples that have been qualitatively tested, several samples have borax content which was tested using turmeric extract, showing that the color change in the meatball samples that had been dripped with turmeric extract contained 3 negative control meatball samples (-) A, C, D, and 2 positive controls (+) B and E, while the 2 positive (+) meatball samples were tested using borax FT-IR to detect OH groups (Hydroxyl) C=C bonds and C-H bonds are found in the Spectra.

Keywords: *Boraks, BTP, FTIR, Meatballs, Turmeric*

INTRODUCTION

The change in food consumption from natural to ready-to-eat food is experienced by Indonesian people today. In order to meet the needs of the community for food products that are free from damage and contamination, including contamination by toxins, microbes and chemical compounds, food safety is an important factor to pay attention to and apply in the food processing process. According to Republic of Indonesia Law No. 18 of 2012 concerning food, the third part regarding the Regulation of Food Additives, article 75 states that every person who produces food for distribution is prohibited from using food additives that exceed the specified maximum threshold and/or prohibited materials. used as a food additive (akhirul, 2020).

One of the causes of food poisoning is the presence of chemical contamination in food such as borax, formalin and rhodamine-B. It is also known that 2.93% of snack food samples for school children contain borax, 1.34% contain formaldehyde and 1.02% contain rhodamine-B. B (Misbah et al, 2017). The accumulation of these materials in the body can have a negative impact on health. The negative effects of borax toxicity in humans can still be tolerated, such as decreased appetite, digestive system disorders, respiratory problems, mild central nervous system disorders such as easy confusion, anemia, and hair loss. However, if the toxin dose has reached or even exceeded the maximum limit, it will cause fatal effects, starting from vomiting, diarrhea, shortness of breath, stomach cramps and upper abdominal pain (epigastric), nausea, weakness, bleeding, gastroenteritis accompanied by vomiting of blood and severe headaches Borax is not only absorbed through digestion but can also be absorbed through the skin (Pandie, 2014).

One of the processed foodstuffs that are very popular in Indonesia is Meatballs, as a result of processed foodstuffs of animal origin that have undergone modifications in the manufacturing process. Traders often use chemicals, namely borax, as an additional ingredient to create meatballs with good sensory value so that consumer satisfaction is maintained and avoid large capital costs, where borax can reduce meatball ingredients, among other things, borax can actually replace meat in texture. Meatball quality. Methods for processing meat into meatballs often do not pay attention to health aspects. The addition of dangerous additives that are toxic in nature is intended to increase the sensory value of Bakso products (Salawati, 2019).

Turmeric extract can be used as a borax detector because it contains the compound curcumin because curcumin can break down the bonds of borax into borax acid and bind it into a rose-colored complex or what is usually called a complex boroncyano curcumin compound. Borax is weakly wet with a pH of 9.15-9.20. Meanwhile, turmeric is yellow or orange-yellow in acidic conditions and red in alkaline conditions. So, when food containing borax is dropped on a meatball sample, the meatball sample changes color to brick red or brownish (Susanti, 2023).

Apart from using turmeric to determine the borax content in meatball food, you can also use an FTIR tool whose function is to determine the number of functional groups contained in borax. Where FTIR is a tool that can analyze chemical compounds. (Risal, 2020). Based on several cases of the use of borax in food above, researchers are interested in conducting qualitative testing of the borax content in meatballs and the FT-IR test.

METHOD

Time and Place of Research

This research was carried out from May to August 2023. Research on the identification of borax compounds in meatballs using the qualitative test of turmeric extract (curcumin) & FTIR test was carried out at the Central Lombok District Health Service Laboratory, and the FTIR test was carried out at the Mataram University Laboratory.

Tools and materials

Tools used: Blender, filter, knife, beaker, spoon, sputum pot, analytical balance, measuring flask, Erlenmeyer flask, test tube, centrifuge, and FT-IR. The ingredients used are distilled water, turmeric and meatballs.

Work procedures

This research was carried out with two main procedures, namely meatball extraction and turmeric extraction. Extraction of the meatballs begins by weighing each one with a weight of 1 gram, then slicing it, then grinding it using a mortar and adding enough distilled water. The next step is filtering it using filter paper. After filtering, each meatball sample is put into a sputum pot that has been given label. Meanwhile, turmeric extraction begins by weighing 50 grams of turmeric, then the turmeric is peeled and cleaned. After cleaning, the turmeric is grated and filtered, the turmeric is filtered and mixed with 50 mL of distilled water to produce turmeric extract.

Data collection

Identify Meatballs with Turmeric Extract

The 5 meatball samples that had been labeled in the sputum pot were dripped with 2 drops of turmeric extract each. Observe the color change that occurs for 15 minutes. If the sample changes to brownish red, then the sample contains borax, while if the color changes to yellow/orange (turmeric color), then the sample is negative and does not contain borax (Muthi'ah, 2021).

Identification using FTIR

Prepared 2 samples of meatballs B and E which had been tested for turmeric extract and were thought to produce positive (+) borax, then weighed 5 grams each, added 20 mL of distilled water, then ground using a blender. The ground meatball samples B and E were put into a test tube and centrifuged. The centrifugation process was carried out for 20 minutes at a speed of 3000 rpm and filtered. The supernatant was taken and put into a labeled sputum pot and tested using the FT-IR instrument.

RESULTS AND DISCUSSION

Borax detection in meatball samples sorted by names A, B, C, D, and E. Where the positive test results (+) are found in meatball samples B and E, while negative results (-) are found in meatball samples A, C , and D. The results of examining the borax content in meatballs are presented in Table 1.

Table 1. Results of Borax Examination in Meatballs

No	Food name	Results	Information
1.	Meatball A	(-)	Negative
2.	Meatball B	(+)	Positive
3.	Meatball C	(-)	Negative
4.	Meatball D	(-)	Negative
5.	Meatball E	(+)	Positive

Borax analysis in Table 1, meatball samples A, B, C, D, and E were tested using turmeric extract. Meatball samples B and E contain borax, this is due to the formation of a complex compound in an alkaline environment, while the 3 meatball samples, namely A, C, and D, did not show a color change reaction but remained yellow or orange because the meatball samples were acidic. Meatball sample B was weighed at 5 grams then mixed with 20 mL of distilled water, then ground. The sample was put into a test tube and put into a certification device and carried out for 20 minutes at a speed of 3000 rpm. After completion of certification, meatball sample B was filtered using filter paper. The supernatant was taken and put into a sputum pot which had been labeled Meatball sample B and tested for FT-IR. . The FT-IR spectrum of sample B is in Figure 1.

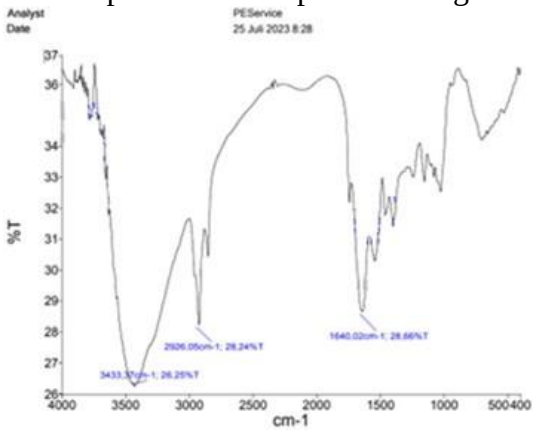

Figure 1. FT-IR spectra of sample B

There are spectra with hydroxyl groups OH and having bonds (C=C) & (CH) of high intensity similar to the characteristics of borax compounds, where if there is a typical peak similar to borax it will appear marked with a functional group area and a 3000-fingerprint. 3600, namely the borax (OH) hydroxyl functional group. Meanwhile, the borax bond (C=C) is marked with a functional group region and fingerprint 1640-1680cm^{-1}. The bond (CH) is found in the functional group and fingerprint region 2850-2960cm^{-1}emerging. Based on Figure 1, the resulting spectrum is in the functional group (OH) region, namely hydroxyl in the functional group number and fingerprint 3433.37cm^{-1}appears with high intensity, while the bond (CH), appears at the functional group number and fingerprint of 2926.05cm^{-1}. The bond (C=C) appears in the functional group and fingerprint 1640.02cm^{-1}.with low intensity. E positive (+) meatball samples that have been tested for turmeric extract are thought to contain borax. Meatball sample E was continued with FT-IR testing to ensure the accuracy of the results. Certification testing was carried out at the Central Lombok district health office laboratory. Meatball sample E was weighed at 5 grams then mixed with 20 mL of distilled water, then ground. The meatball sample E was put into a test tube and put into the certification apparatus for 20 minutes at a speed of 3000 rpm. After completion of certification, the meatball sample E was filtered using filter paper, the supernatant was taken and put into a sputum pot that had been given and the FT-IR test was carried out. The FT-IR spectrum of sample E is seen in Figure 2.

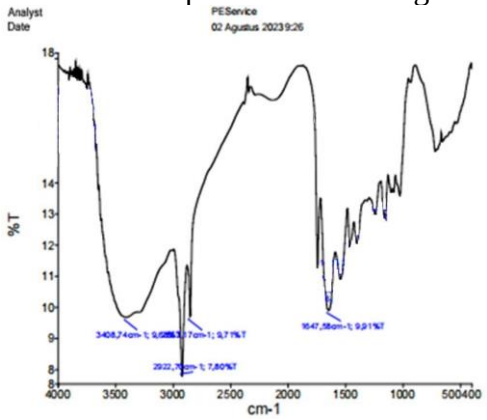

Figure 2. FT-IR spectra of sample E

There are spectra with hydroxyl groups (OH) which have (CH) bonds and (C=C) bonds of high intensity, similar to the characteristics of borax compounds. Where there are distinctive peaks similar to borax that will appear marked with functional group areas and fingerprints 3000-3600cm^{-1}, namely the borax (O-H) hydroxyl functional group. Meanwhile, the functional bond of borax (CH) is characterized by the functional group area and fingerprint 2850-2960cm^{-1}appear. Meanwhile, group bonds (C=C) are found in the functional group and fingerprint regions 1640-1680cm^{-1}. Based on Figure 2, the meatball E sample produces a spectrum in the region where the hydroxyl functional group (OH) appears in the functional group number and fingerprint of 3408.74.cm−1. Bond (CH), appears in the functional group number and fingerprint 2922.70cm^{-1}. The bond (C=C) appears in the functional group and fingerprint 1647.58$cm^{-1}$with low intensity.

CONCLUSION

Main conclusion Based on the results of research entitled Identification of Borax Compounds in Meatballs Using the Qualitative Test of Turmeric Extract and FT-IR Test. There is borax content using the turmeric extract and FTIR test methods. In the 5 meatball samples that were dripped with turmeric extract, there were 2 meatball samples B and E that were positive for containing borax. Comes from different meatball traders. 2 Meatball samples tested positive for borax compounds.

SUGGESTION

For further research, it is hoped that several supporting instruments such as GC-MS and HPLC will be used to determine the borax compounds contained in several food samples.

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