



Qualitative Analysis of Borax in Wet Noodles in Makassar City

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ABSTRACT

Borax, or sodium tetraborate, is a dangerous chemical compound that is banned from use as a preservative in food due to its potential health risks. Wet or instant noodles are a form of processed food from wheat flour that is widely consumed and favored by various levels of society, especially in school. The addition of borax to wet noodles aims to increase the chewiness and shelf life of the noodles. This study aims to identify the presence of borax in school's snack noodles. Qualitative analysis was used as the research method with *purposive sampling* technique in three sub-districts, namely Tamalate, Mamajang, and Rappocini sub-districts of Makassar City. The sampling criteria were wet noodles complementing meatball snacks from street vendors in front of the gate of elementary schools, and 15 noodle samples were obtained. Qualitative analysis was carried out by organoleptic test and color change of filter paper that had been soaked in curcumin extract from turmeric. The results showed that the wet noodle samples were pale yellow to bright yellow in color with a maximum shelf life of 24 hours. The test results with turmeric paper showed no color change, so it was concluded that all noodle samples did not contain borax.

Keywords: qualitative analysis; borax; wet noodles; school; makassar

I. INTRODUCTION

Snack noodles are a popular and affordable food option in Makassar, Indonesia (Al-Baarri et al., 2021; Dewita et al., 2019). Street noodles are a popular food in Indonesia, but their food safety is often questioned. Noodles are a simple and cheap type of food, so they can be reached by almost all people. Wet noodles are a flour-based food that is favored by many people, especially school children, because it is practical, filling, easy to obtain, relatively cheap and can be served into a varied menu (Sari, N.I, et al, 2024; Werdiningsih, 2023, Sari and Tazkiya, 2022). The widespread availability and consumption of these noodles has raised concerns among the public and regulatory authorities about the potential use of banned food additives such as borax in their preparation (Harahap et al., 2022).

Borax, or sodium tetraborate, is a chemical compound that has been banned from use in food products due to its harmful health effects if consumed (Suhairi et al., 2019; Nurlailia et al., 2021). This study aims to investigate the prevalence of borax in street noodles sold in Makassar City and assess the safety of these products for public consumption. One of the

emerging issues is the use of borax as a food additive. Borax, or sodium tetraborate, is a chemical compound that is banned from use in food due to its harmful effects on health (Sari, N. I., et al, 2024; Purwanti, et al, 2023). Borax is a white, high concentration mineral salt mixture containing Boron (B) and Oxygen (O) atoms that has the chemical designation Sodium tetraborate decahydrate with the molecular formula $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ or $\text{Na}_2[\text{B}_4\text{O}_5(\text{OH})_4] \cdot 8\text{H}_2\text{O}$. Borax is very harmful to human health if inhaled, drunk, eaten and then enters the human body in large quantities. Food containing borax consumed little by little will result in the accumulation of carcinogenic borax chemicals in human organs such as the liver, brain, kidneys and testes. If consumed at high enough levels, borax can cause symptoms of dizziness, vomiting, loose stools, abdominal spasms, kidney damage and loss of appetite.

Several studies have highlighted the problem of borax contamination in various foods, especially in traditional or homemade products (Suhairi et al., 2019; Amelia et al., 2014; Rahman et al., 2019; Nurlailia et al., 2021). According to the Regulation of the Minister of Health of the Republic of Indonesia No. 033 of 2012, the use of boric acid or borax as a food additive is strictly prohibited, as it can have adverse effects on human health, including kidney and liver damage, and even death (Nurlailia *et al.*, 2021). Furthermore, the 2020 BPOM report based on the results of an evaluation by taking food samples from the market examined the test parameters of borax, formalin, rhodamine B and methanil yellow. The results found that about 6% of food contained borax as a hazardous food additive. The legal safe limit for borax use in food is one gram/one kilogram of food (1/1000) (N. Utami and Andriani, 2021). Due to its carcinogenic effects on human health, the government has officially banned the use of borax as an additive in the food production process.

II. METHODS

This study investigated the identification of wet noodles sold as a complement to meatball snacks by street vendors located outside elementary schools within three sub-districts of Makassar City, namely, Tamalate, Mamajang, and Rappocini. A purposive sampling technique was used to select fifteen noodle samples for this study, collected between May and June 2024. The research methodology utilized a qualitative approach, incorporating both organoleptic testing and the observation of the colour changes in turmeric paper. The sample was taken and then analyzed for borax content at the Science Education Laboratory, FMIPA, Universitas Negeri Makassar.

The stages in analyzing borax content in wet noodles are described in Figure 1.1

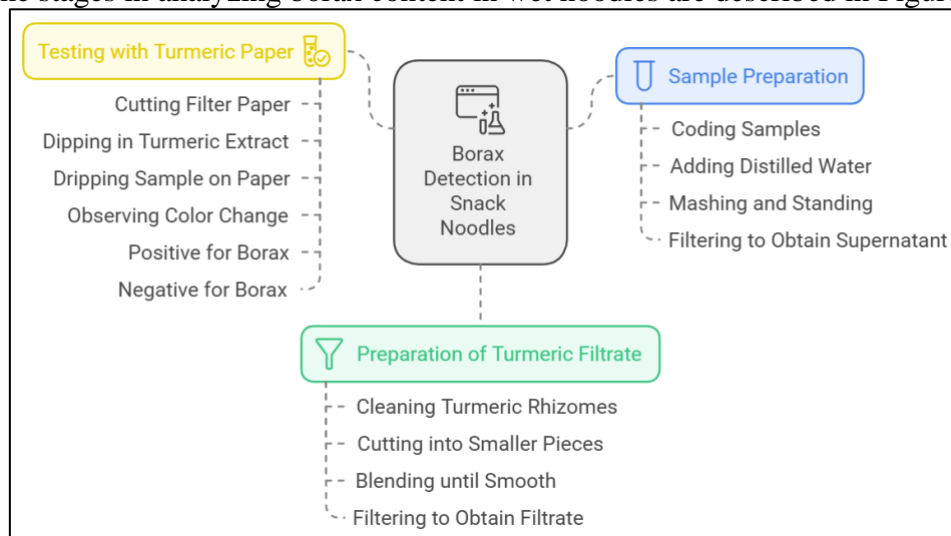


Figure 1.1. The stage in analyzing borax in wet noodles

1) Sample Preparation

Wet noodle samples were placed in a dry plastic container and coded based on the sampling site. Samples were taken as much as 5 grams, then added with 100 mL of distilled water and mashed. The sample was allowed to stand for 15-20 minutes. Next, filtered using filter paper and taken the clear top as a test sample in the form of supernatant (Rahma, *et al*, 2023).

2) Preparation of Turmeric Filtrate

Turmeric rhizomes are cleaned and then cut to a smaller size, then blended until smooth. Filter using filter paper so that the liquid or turmeric filtrate is obtained (Amalia, 2023; MN Putri, 2022).

3) Testing with Turmunic Paper

Filter paper is cut into smaller pieces and dipped in turmeric extract and then allowed to stand for 3 minutes. Then the sample is dripped on the filter paper until evenly distributed. Let the filter paper stand. Observe the color change that occurs

a) Positive for borax, if the filter paper changes color to brownish red, then the snack noodles are positive for borax.

b) Negative for borax, if the filter paper remains yellow or the color change is not significant, then the snack noodles are negative for borax.

III. RESULTS AND DISCUSSION

A total of 15 wet noodle samples were collected from schools and analyzed using organoleptic or sensory testing. Five indicators were observed in the sensory evaluation are color, smell, texture, and durability (N. Utami et al., 2021) dan (Rahma et al., 2023). The results of the sensory evaluation are presented in Table 1.1.

Table 1.1 Result of the sensory evaluation of wet noodle samples

No	Sample code	Physical characteristics			
		color	smell	texture	Durability (hours)
1	M1A1	Pale yellow	No pungent odor	chewy	24
	M1A2	Yellow	No pungent odor	chewy	24
	M1A3	Yellow	No pungent odor	chewy	24
	M1A4	Yellow	No pungent odor	chewy	24
	M1A5	Pale yellow	No pungent odor	less chewy	24
2	M2A1	Yellow	No pungent odor	chewy	24
	M2A2	Yellow	No pungent odor	chewy	24
	M2A3	Yellow	No pungent odor	chewy	24
	M2A4	Yellow	No pungent odor	chewy	24

No	Sample code	Physical characteristics			
		color	smell	texture	Durability (hours)
3	M2A5	Pale yellow	No pungent odor	chewy	24
	M3A1	Pale yellow	No pungent odor	less chewy	24
	M3A2	Yellow	No pungent odor	chewy	24
	M3A3	Yellow	No pungent odor	chewy	24
	M3A4	Yellow	No pungent odor	chewy	24
	M3A5	Yellow	No pungent odor	chewy	24

(Testing at room temperature)

Based on the Tabel 1.1, fifteen noodle samples, M1A1 through M3A5, were evaluated for their physical characteristics after 24 hours. These characteristics included durability (categorized as "chewy" or "less chewy"), texture, smell (with "no pungent odor" being the consistent observation), and color, ranging from yellow to pale yellow. Samples M1A1, M1A5, M2A5, and M3A1 exhibited a pale yellow color and were generally less chewy than the other samples, which displayed a more vibrant yellow hue.

A notable trend emerged across the different sample groups, M1, M2, and M3. Within each group, A1 through A5, the noodles consistently maintained a chewy texture and lacked any pungent odor. The primary variation within groups appeared in the color, with some samples exhibiting a pale yellow color compared to the more common yellow. This suggests that while the base ingredients and preparation methods might be similar across samples, slight variations in processing or ingredients could be influencing the final color of the noodles. All samples maintained their integrity for 24 hours, indicating good durability across all groups. However, this test only covers a short timeframe. Longer-term durability testing is recommended to assess the material's performance over a more extended period. The absence of a pungent odor across all samples is a positive finding, suggesting the material is stable and doesn't release volatile compounds under the tested conditions. This aligns with previous research findings, which indicate that desirable characteristics of fresh noodles include a chewy texture, a bright yellow or yellowish-white color, and a fresh flour aroma without any sour or musty odor (Sari, N. I et.al., 2024) (N. Utami et.al., 2021) (Werdiningsih, W., 2023) (Widyan, R., & Ratulangi, W. R 2024).

The principle of qualitative testing of borax content in wet noodles in school snacks is that turmeric filtrate contains curcumin which will react with borax to form a brownish red compound. The more intense the brownish red color, the higher the borax content in the noodle sample. Turmeric paper serves as a straight forward and convenient tool for detecting the presence of borax, specifically boric acid, through a simple color change reaction. When a drop of a solution suspected to contain boric acid comes into contact with turmeric paper, the wet spot may initially resemble a water. This color transformation occurs because the boric acid reacts with curcumin, the active compound in turmeric. This reaction produces a new substance called rosocyanine, which gives the stain its reddish color. The test results are presented in Table 1.2

Tabel 1.2 Borax test results in samples

No	sub-District	Noodle code	Result
1	Tamalate	M1A1	Negative
		M1A2	Negative
		M1A3	Negative
		M1A4	Negative
		M1A5	Negative
2	Rappocini	M2A1	Negative
		M2A2	Negative
		M2A3	Negative
		M2A4	Negative
		M2A5	Negative
3	Mamajang	M3A1	Negative
		M3A2	Negative
		M3A3	Negative
		M3A4	Negative


No	sub-District	Noodle code	Result	
		M3A5		Negative

Table 1.2 displays the test results of noodle samples taken from three sub-districts, Tamalate, Rappocini, and Mamajang. Each district is represented by five noodle samples with different codes M1A1-M1A5, M2A1-M2A5, and M3A1-M3A5. All noodle samples from the three districts showed negative results. This indicates that the noodles tested from these three districts do not contain certain substances or contaminants that were being screened for in the test. The absence of detectable contaminants across all noodle samples suggests adherence to food safety standards within the three sub-districts, given the analytical focus on harmful substances.

Several prior studies utilized turmeric filtrate to detect borax in fresh noodles. Werdiningsih analyzed five noodle samples sold in the Bandar area of Kediri City and found them to be borax-free. Additionally, (Amalia and Hasanah., 2023) tested eight fresh noodle samples from Grogolan Market in Pekalongan City using the turmeric toothpick method. Their results indicated the absence of borax in all samples. Results of borax identification in 10 yellow noodles from vendors in Mataram City showed all samples were negative for borax, indicated by the absence of a color change in the yellow test paper (Widyan & Ratulangi, 2024).

Based on the research results of all 15 wet noodle samples, none contained borax. This indicates that noodle vendors have a good awareness of maintaining food safety standards for public consumption.

IV. CONCLUSION

Based on the research results, it can be concluded that of the 15 wet noodle samples from elementary school snacks obtained from three districts in Makassar City, none of the samples tested positive for borax after being tested using turmeric paper. This indicates that the wet noodles are safe for consumption.

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