

## Investigation into the Health Danger of Potassium Bromate in Bread Consumed in Sapele Town, Delta State

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**ABSTRACT:** The health danger of potassium bromate in bread consumed in Sapele town was investigated using standard analytical methods. A total of fifteen (15) different brands of bread were used for the study. From the result obtained, three (3) (B, B, and B) out of the 15 bread brands qualitatively showed no visible colour, five (5) showed light purple colouration while the rest showed purple and dark purple colouration respectively. The observed three may be as a result of the bread brand not containing potassium bromated or they contain a non detectable amount by the reagent. The least quantity amount of potassium bromated detected was 1.00 $\mu$ g/ml (1.00 $\mu$ g/g) and the maximum quantity was 4.21 $\mu$ g/ml (4.21 $\mu$ g/g). The allowable maximum amount of potassium bromated in bread according to FDA is 0.02 $\mu$ g/g (Ekop et al, 2008). All fifteen bread brands studied exceeded the acceptable limit of 0.02 $\mu$ g/g set by FDA and this can be very dangerous for the bread consumers in the study area and its environs. All stakeholders and the necessary agencies on food control should rise up to the task of monitoring the production and consumption of bread in this locality.

**Keywords:** absorbance, bread, bromate, dangerous, potassium

### I. INTRODUCTION

Bread has a historical importance in many Western and Eastern societies and as a staple food in many countries of the world (Ahmad et al, 2016). Bread is an important source of food in Nigeria. It is consumed extensively in homes, restaurants and hotels. Bread is made from low protein wheat and it usually contains several ingredients that would help improve the quality of the bread (Emeje et al, 2010). Some of the basic identified ingredients, apart from flour are table salt, sugars, flavours and at least a flour improver such as potassium bromated (Emeje et al, 2010).

The use of potassium bromated has been a common device among millers and bakers throughout the world because it is cheap and probably the most efficient oxidizing agent (Emeje et al, 2010). Potassium bromated is a white crystalline, granule or powder which is colourless, odourless and tasteless. It has no medicinal value but it is usually added to flour as a maturing agent to dough, to fish paste as a conditioner and also to beer or cheese (Achukwu et al, 2009). Studies have shown that potassium bromated has adverse effects. In humans, potassium bromated can cause cough and sore throat when inhaled (Atkins, 1993). Abdominal pains, diarrhea, nausea, vomiting, kidney failure, hearing loss, bronchial and ocular problems (Atkins, 1993).

Many countries have for long removed potassium bromated from the list of permitted food additives. The WHO also has since 1993 banned the use of potassium bromated in food processing (NAFDAC, 2003). It is against this background that this investigation was undertaken in Sapele Town which serves as the Headquarters of Sapele Local Government Area of Delta State where bread production and consumption is very high. This study therefore aimed at investigating into the health danger of potassium bromated in bread sold and consumed in Sapele town.

## II. MATERIALS AND METHODS

The following reagents were used: Hydrochloric acid, potassium iodide, distilled water. Different bread samples were purchased from open stores/markets, bus stops and from bread vendors in Sapele town. A total of fifteen (15) different brands of bread were used for this study.

## III. METHODS

Potassium bromated in the different bread samples was quantitatively and qualitatively analyzed using reported methods (David, 1976) with little modifications. 5g quantity was weighed out from each of the bread sample in an electronic weighing balance. This was transferred into a beaker and 20ml of distilled water was added. The mixture was shaken and allowed to stand for 30minutes at  $28 \pm 10$  °C. A 5.0ml volume was decanted from the beaker into a test tube and a 5.0ml quantity of freshly prepared 0.5% potassium iodide solution in 0.1N hydrochloric acid was added. Colour change was noted in the different bread samples. The presence of potassium bromated was indicated by change in colour from light yellow to purple (David, 1976). The absorbances of the samples were taken at 620nm in a UV-visible spectrophotometer (750N). Absorbances of the samples were converted to concentration with reference to the Beer's calibration curve.

## IV. RESULTS AND DISCUSSION

**Table 1:** Quantitative and Qualitative Determination of Potassium Bromate in Bread Samples.

Bread Samples	Colour Reaction With Potassium Bromate	Quantity Of Potassium Bromate Found ( $\mu\text{g/G}$ )
B <sub>1</sub>	Light Purple	2.421 $\pm$ 0.002
B <sub>2</sub>	Purple	3.310 $\pm$ 0.004
B <sub>3</sub>	Purple	3.260 $\pm$ 0.001
B <sub>4</sub>	Light Purple	1.310 $\pm$ 0.003
B <sub>5</sub>	No Visible Colour	1.002 $\pm$ 0.000
B <sub>6</sub>	Dark Purple	4.216 $\pm$ 0.011
B <sub>7</sub>	Light Purple	2.310 $\pm$ 0.008
B <sub>8</sub>	Purple	2.817 $\pm$ 0.012
B <sub>9</sub>	No Visible Colour	1.004 $\pm$ 0.001
B <sub>10</sub>	Dark Purple	4.109 $\pm$ 0.014
B <sub>11</sub>	Purple	1.823 $\pm$ 0.006
B <sub>12</sub>	Purple	2.219 $\pm$ 0.017
B <sub>13</sub>	No Visible Colour	1.100 $\pm$ 0.010
B <sub>14</sub>	Light Purple	3.019 $\pm$ 0.013
B <sub>15</sub>	Light Purple	3.120 $\pm$ 0.021

## V. DISCUSSION

Table 1 above shows the quantitative and qualitative determination of potassium bromate in fifteen (15) different brands of bread samples used in this study. Qualitatively, three (3) out of the 15 bread brands showed no visible colour, five (5) showed light purple colouration while the rest bread brands showed purple and dark purple colouration respectively. Potassium bromate complexed with potassium iodide to give a purple colouration and the degree of colour change correlates with the level of potassium bromate present (Emeje et al, 2010). Three (3) of the brands (B<sub>5</sub>, B<sub>9</sub> and B<sub>13</sub>) showed no visible colouration which may be as a result of the bread brands not containing potassium bromate or they contain but in a residual amount that could not be detected by the reagent.

The least quantity of potassium bromated detected was 1.00 $\mu\text{g/ml}$  (1.00 $\mu\text{g/g}$ ) and the maximum quantity was 4.21 $\mu\text{g/ml}$  (4.21 $\mu\text{g/g}$ ). The maximum amount of potassium bromated allowed in bread by FDA is 0.02 $\mu\text{g/g}$  (Ekop et al, 2008). All fifteen (15) bread brands studied exceeded the acceptable limit of 0.02  $\mu\text{g/g}$  set by FDA which simply means that none of fifteen (15) bread brands marketed in Sapele town is safe for human consumption (Emeje et al, 2010).

Potassium bromate is a flour improver that acts as a maturing agent. It acts principally in the late dough stage giving strength to the dough during late proofing and early baking (Emeje et al, 2010). There are basically two ways by which humans may get poisoned with potassium bromate—by ingestion when it is present in food such as bread and by inhalation. It is therefore not safe for the bread consumer and the factory worker(s) who

works in a bakery where the poisonous substance is used as a bread improver. Though potassium is used in small amounts, it disappears during baking.

## VI. CONCLUSION

The result of this study showed that, all fifteen (15) bread brands/samples analyzed contain potassium bromated above limit. This study also underscores the importance of routine checks by the regulatory authorities in order to ensure that bakers always comply with rules and regulations in order to safe guard the life of consumers in particular and Nigerians in general.

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