

# Determination of Iodine Content in National Agency of Food and Drugs Administration and Control (NAFDAC) Approved Table Salts

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**Abstract-** The study was aimed at determining the content of iodine in NAFDAC approved Table Salts used in Nigeria. Three Table Salts brands namely: Dangote fine edible salt, Royal edible salt and Mr. Chef edible salt was purchased from a retail shop in Makurdi, Benue State, Nigeria. The iodine content of each of the three brands of salt sample were carried out using the titrimetric method. Potassium Iodide (KI) was used for salt iodization. Results show that the Dangote fine edible salt contained 39.6 ppm of iodine while the Royal edible salt contained 41.8 ppm and the Mr. Chef edible salt contained 42.9 ppm. The result confirms that each of the three samples met the iodine content requirements approved by NAFDAC. However, the results were generally lower than the value found at the production level (50 ppm) for each. This could be explained by the fact that iodine content in salt decreases continuously with time. The results were within the acceptable range for human consumption 50 ppm to 30ppm.

**Index Terms-** Iodine content, NAFDAC approved edible salt

## I. INTRODUCTION

Iodized salt is table salt which has been fortified with the essential trace mineral, iodine (Aburto et al, 2014). Many salt producers make iodized salt and it is readily available in most markets. A package of iodized salt will always be clearly marked, indicating that it contained dietary iodine. Salt which does not contain iodine may also be carefully labelled, especially when iodized salt is very common, to ensure that the consumer knows that he or she will not receive dietary iodine from the particular package of salt (Akunyili, 2003).

Iodine appears to have an important impact on the health of the thyroid gland. An unhealthy thyroid can lead to a number of conditions such as goiter, a swelling of the pituitary gland which manifests as a lump in the neck (Egbuta and Onyezili, 2002; Purnendu, 2008; Aburto et al 2014). A condition called cretinism, characterized by developmental and mental delays, reproductive failure, increased child mortality and socio-economic compromise is also caused by iodine deficiency (Merkel, 1984). The role of iodine in take in both of these conditions was recognized in the 20<sup>th</sup> century, and since they are fully preventable through diet, public health advocates hope to entirely eliminate them at some point (Rosenfeld, 2000; Egbuta and Onyezili, 2002).

Many things are natural sources of iodine. Salt, water, fish and sea vegetables for example both contain abundant amount of iodine. The material can be found in plants grown on soil which is rich in oceanic materials, and in animals grazed on such soil. In some regions of the world, however access to iodine is limited, and condition like goiter are epidemic (ICCIDD, 2000; Aburto et al, 2014).

Table salt with iodine does not generally have a noticeably different flavour, according to taste tests. Therefore most people are encouraged to use iodized table salt, to ensure that they receive plentiful amounts of this vital element (WHO, 1996; Akunyili, 2003). One does not really need much of it, about 150 micrograms a day is the recommended daily allowance, and one teaspoon of iodized salt typically offers about 400 micrograms. Some countries also make fluorinated salt to promote dental health, and salt may be supplemented with other dietary minerals as well ( WHO1996,NAFDAC, 2004).

The objective of the study was to confirm iodine content of edible (table) salts sold at the retail point for human consumption irrespective of their method of preparation, conformed with NAFDAC approved specification using a sensitive method of iodine determination.

## II. MATERIALS AND METHOD

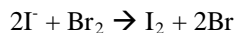
### Materials

Three samples of salt, namely: Dangote Refined Iodized salt, Royal iodized salt and Mr. Chef iodized salt were purchased from a retail shop in Makurdi. All the salts were packaged in small bags made of polypropylene (500 g, 1000 g). labelling notice on each sample included legally mandated information such as, purity of salt, presence of ingredients like anti-caking agents and the amount of iodine in mg/kg as Potassium Iodide (KI).

### Method

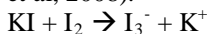
50 g portions of each salt were separately dissolved in water in a 250 ml volumetric flask, made up of mark and filtered. 200 ml of filtrate was transferred into a conical flask.

1 mL of saturated Bromine (saturated Bromine is usually used for oxidation of iodide to iodine), was added.



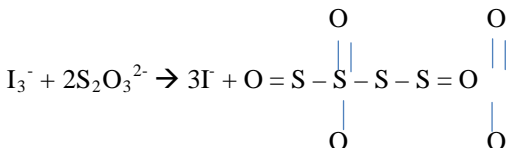
A few glass beads were introduced into it and boiled until all the water evaporated (excess bromine was removed by boiling). More distilled water was added to just dissolve the solid

mass (after cooling), made faintly acidic to methyl orange and 0.2 g Potassium iodide (KI) was added. (Morris 1985, Purnendu et al, 2008).



The liberated iodine solution as titrated with 0.005 M Sodium thiosulphate. As the reaction proceeded, light blue colour was seen, and 2 mL of the starch solution was then added to form and intense blue colour. The end point occurred when the blue colour disappeared (Morris 1985; Pandav 1999).

**Titration Equation**



Knowing the concentration of the Sodium thiosulphate, the concentration of the iodine remaining was calculated. 1 mL 0.005 M Sodium thiosulphate 0.001058 g iodine.

**III. RESULT AND DISCUSSION**

**Results**

**Table 3: Iodine content of salt samples determined by titrimetric**

S/N	Salt Samples	Iodine Concentration (ppm)	% Concentration
1	Dangote fine edible salt	39.6	79.2
2	Royal edible salt	41.8	83.6
3	Mr. Chef edible salt	42.9	85.8

**Discussion**

For human consumption in Nigeria, table salt iodization is made mandatory by constituted authority NAFDAC (NAFDAC, 2004). This is because iodine appears to have an important impact on the health of the thyroid gland, iodine deficiency leads to an unhealthy thyroid which can lead to a number of conditions including goiter, a swelling of the pituitary gland which manifests as a lump in the neck. In view of this NAFDAC approved 50ppm to 30ppm as the minimum iodine content in table salt. This is to prevent iodine deficiency disorders (IDD) among the human population in the country ( Akunyili, 2003). Results obtained from the analysis of the three samples of salt at retail level shows each of the sample to contain the required concentration of iodine as required by NAFDAC. Dangote fine edible salt 39.6 ppm, Royal edible salt 41.8 ppm and Mr. Chef edible salt 42.9 ppm. The results were generally lower than the values found at the site of production (50 ppm) NAFDAC, (2004). This agrees with preliminary studies which showed that the iodine content of iodized salt decreases continuously during the whole process from the salt plant to the consumer (Rosenfeld, 2000; WHO 1996). All expired salts whose iodine content has

become lower than 30ppm is flushed out of the market by NAFDAC agent (Akunyili, 2003).

**IV. CONCLUSION AND RECOMMENDATION**

**Conclusion**

The results of analysis of the three samples of salt collected from the retail shop, in Makurdi show that each of the salt samples has iodine content that is agreeable with NAFDAC approved range for human consumption. Hence the three brand of salt namely, Dangote edible salt, Royal edible salt and Mr. Chef edible salt can be consume by human population in Nigeria without any fear of unhealthiness.

Results obtained from each of the three samples of salt (39.6 ppm, 41.8 ppm and 42.9 ppm) was lower than the value found at the site of the production level (50 ppm). This result is concluded to be correct since iodine content in salt decrease with time. However, the results obtained are within the acceptance range for human consumption, since NAFDAC approved range is 50 ppm – 30 ppm. Below 30 ppm iodine concentration NAFDAC disapproved, and declared the salt unhealthy for human consumption because it causes goiter.

**Recommendations**

Based on this research for its future improvement and development the following are recommended.

1. Spot testing kids method are not very reliable and acceptable as titration method, the titration equipment and chemical should be made available in every NAFDAC State laboratory for regular confirmation of iodine content in salt, since it decrease with time.
2. All iodized salt should be bagged in polypropylene/plastic materials since it is air tide.
3. All the salt manufacturers should always be reminded through the media that printing of dates of salt iodization at the back of the salt package bags are important. It will help the consumer to know which salt is over three months since any salt that stayed above three months losses it iodine content.

**ACKNOWLEDGEMENT**

We acknowledge the effort of Mr. James Kagbu and Mallam Abubakar of NAFDAC Office Maiduguri for technical assistance during iodine content analysis in NAFDAC laboratory. We greatly appreciate the mentoring of Prof. Rufus ShaAto.

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