

Investigation on the stability of Iodide and Iodate in table salts in Iran and the determination of its impurities

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In the most parts of Iran, IDD (Iodine deficiency disorders) has been observed such as endemic or hyperendemic goitre and endemic cretinism. Iodinated salt is the most practical effective and satisfactory means for correction of Iodine deficiency in most endemic areas. Since table salts of Iran are usually not purified, the concentration of some impurities in the salts is several times more than the standard value. Considering that the normal daily human salt requirement is about 10 grams, the intake of these impurities is significant. With this information in mind, an investigation was undertaken to compare the stability of Iodide and Iodate salts for addition of Iodine to these kinds of salts.

1. Introduction

Iodide deficiency disorders (IDD), is a threat for more than one billion people in the world, including Iran. In 23 countries in Mediterranean area more than 40 million suffer from Iodine deficiency and related disorders. Goiter is one of most conspicuous signs of Iodine deficiency disorders in an area. The thyroid gland produces necessary body hormones such as thyroxin; it needs iodine. If iodine is not received through food, from vegetable or animal sources, the thyroid gland can not produce ample hormones, which play basic role in different vital reactions.

2. Situation of IDD in Iran

Eastern Mediterranean area countries have the highest rate of IDD. The prevalence of endemic goitre is high in some of the countries of the area. Reports show that IDD exists in Iran, Afghanistan, Iraq, Lebanon, and Pakistan. A report about epidemic of Goiter in Iran indicates that in areas like Shahriar more than 60% of the people is affected, in the Ardakan area more than 53%, and in Boer-Ahmad area, adjacent to Fars province 95% of the woman and 87 % of the men more than 6 years of age are affected. Hypothyroids and retarded cases related to IDD in rural areas around Imam-Zadeh Davoud about 40 km north west of Tehran have been reported. The prevalence of goitre among the girls and boys between 1-6 years of age in East of Tehran, is reported to be 88% and 71.5% respectively.

3. Compensation of Iodine Deficiency

Iodine is a basic need of the body. The human body needs about 120-150 micrograms of iodine per day. Iodine is relatively a scarce elements in nature and is not found in free state. Iodine compounds are mostly in the form of Iodides and Iodates.

A normal person receives 40 % of its necessary Iodine from food and the rest of it from water. An iodine deficiency can be compensated by different food stuffs such as, salt, bread, sweets, milk, sugar and water. But Iodide (Iodate) salts are the most practical and effective and suitable way of compensation of the lack of iodine.

4. Discussion and conclusions

In the developed countries the use of Iodide (Iodate) salt for the prevention of IDD was already started many years ago. Most of these countries use iodide salts for this purpose. Considering this fact the absorbable iodine in body has a valency $-I$ and Iodine in iodate has a valency of $+V$, the iodine in iodate needs to be reduced before the body can use the iodine. Therefore potassium iodide has a priority over iodate. However, in developing countries, the stability of iodine in salt is a prime concern. Therefore potassium iodate is to be preferred over iodine. Also the purity of salt, moisture content and particle size of the salt must be considered since they affect the stability and shelf life.

In a study conducted in material Energy Research centre, impurities in Iranian table salts were investigated and stability of Iodine by using Iodide and Iodate was studied. The results showed that

mixing of potassium iodate in impure table salts is more stable than iodide; due to its low solubility in water it is not affected by impurities, and is not easily separated from table salt. Another factor, which affects iodine stability, is the relative moisture in the salt. Experiments showed that high moisture content salt, gradually loses its iodine and after about one year shelf life it decreases to its %10. Air tight wrapping and packing could minimise the loss. The conclusion is, although potassium iodide is cheaper than potassium iodate and it contains more iodine per unit of mass, the cost of stabilisers and processing make it more expensive than iodate.

This research shows that, temperature, moisture content, and impurities play important role in stability of iodine compounds. The selection of iodate for developing countries, such as Iran, where most of the salts used are still impure it is reasonable to use iodate for short time, until new purification units for table salt are established, since it does not need other stabilisers.

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