

Rapid Measurement of **Iron**, **Vitamin A**, and **Iodine** in Bouillon Cubes with iChecks





Fortified Bouillon Cubes

An estimated 1 billion people, including 35 million babies, do not consume sufficient amounts of iodine. Almost 18 million of these babies are mentally impaired as a consequence. Nearly 2 billion people suffer from anemia, over half of which is due to iron deficiency, a condition that can cause complications in pregnancy, low birth weight, and infant and maternal deaths. Almost 150 million children are affected with vitamin A deficiency that leads to night-blindness, impairs immunity, and increases mortality.

These widespread micronutrient deficiencies are most common in developing countries. To address this health challenge, WHO with other development partners and industries support and promote fortification of staple foods and condiments (1,2).

Condiments such as bouillon cubes consist mainly of salt, seasoning, and dehydrated vegetables. Recent studies indicate that over 95% of the population in West African countries as well as in South Africa consume bouillon cubes on a daily basis. In Nigeria alone, over 100 million bouillon cubes are sold per day (3,4). These figures indicate vitamins and minerals delivered with bouillon cubes have the potential to reach almost all of the population at risk of micronutrient deficiencies.



Photo from Wikipedia

Nearly all bouillon cubes are commercially produced and could be fortified with a combination of iron, iodine, and/or vitamin A. The source of iodine in bouillon cubes is iodized salt while iron or vitamin A are added separately.

Controlling the levels of iron, vitamin A, and iodine during food production, in the end product, and at the market level can be challenging as analysis is complex and expensive. To support the implementation of bouillon cube fortification, BioAnalyt has developed and optimized sample preparation methods for measuring vitamin A, iron, and iodine in bouillon cubes with our innovative technology, iCheck.

References:

1. http://www.who.int/nutrition/events/2014_fortification_condiments_26to28Aug/en/
2. Ndjebayi, et al. Measuring the Costs of Vitamin A Interventions: Institutional, Spatial, and Temporal Issues in the Context of Cameroon. Food Nutr Bull., 36 (Sup. 3), 2015.
3. Engle-Stone R, et al. Consumption of potentially fortifiable foods by women and young children varies by ecological zone and socio-economic status in Cameroon. J Nutr. 2012;142:555-65.
4. Zhengxing C. and Oldewage-Theron W. Household consumption of stock cubes and stock powder in the Vaal Triangle of SA. Nutrition & Food Science, Vol. 34(4), 2004



Measuring **Iron**, **Vitamin A**, and **Iodine** in Fortified Bouillon Cubes with iChecks

iCheck enables you to know, here and now, how much of the vitamins or minerals of interest are in your sample. It is an all-inclusive solution for rapid measurement of nutrients in food and biological samples, consisting of a measurement device and ready-to-use reagent vials. iCheck gives you immediate results and empowers you to take the right action at the right time and location where it is needed most.

What Is Our Product?



Measurement Device

iCheck devices come in a case with all necessary accessories and have a 2-year warranty.



Consumables

Ready-to-use reagent vials come in a Test Kit box, containing consumables for 100 analyses, and have a 12-month shelf-life at room temperature.

How Does It Work?



1. Inject sample



2. Mix and wait for reaction



3. Measure results

There are 3 simple steps to using iCheck: inject your liquid or solubilized sample into the reagent vial; mix and wait a few minutes for the reaction to take place; and then measure the sample with the measurement device.

Measure Bouillon Cubes with Our iCheck Fluoro, iCheck Iron, and iCheck Iodine

Each individual vitamin or mineral is measured with its own iCheck device.



- iCheck **Iron** is a portable, single-wavelength photometer that quantitatively measures iron in your bouillon cube sample.



- iCheck **Fluoro** is a portable, single-wavelength fluorometer that quantitatively measures vitamin A in your bouillon cube sample.



- iCheck **Iodine** is a portable, single-wavelength photometer that quantitatively measures iodine in iodized salt, a raw material that constitutes over 90% of bouillon cubes.



Results with iChecks are Comparable to Reference Methods

All iCheck devices are compared to traditional laboratory methodologies to ensure reliability and accuracy of measurements. Iron analysis with iCheck was compared to mass spectrometry (ICP-MS) reference methods; vitamin A analysis with iCheck was compared to expected concentration in spiked bouillon cubes; and iodine analysis with iCheck was compared to iodometric titration.

To ensure a reliable result with iCheck Iron and iCheck Fluoro, bouillon cubes samples require a simple, but customized sample preparation protocol. For **iron** analysis, cubes must be solubilized in hydrochloric acid, while for **vitamin A** analysis, cubes must be solubilized in heated water. **Iodine** analysis in the iodized salt raw ingredient can use the standard iCheck Iodine sample preparation protocol.

Sample Type	Fortificant Type	iCheck	Concentration	iCheck Precision as RSD ¹	Reference Method	Reference Method Precision as RSD	iCheck Recovery vs. Reference Method
Bouillon cube	Ferric Pyrophosphate	iCheck Iron	400-600 mg/kg	±6%	ICP-MS	±10%	95-102%
Bouillon cube	Retinyl Palmitate	iCheck Fluoro	15-150 mg/kg	±9%	Spiked samples	-	101±11%
Salt	Potassium Iodate	iCheck Iodine	20-80mg/kg	±2.5%	Iodometric Titration	±4.5%	97-106%

(1) RSD – relative standard deviation

Benefits of iCheck



- **Speed:** Results in 5 to 60 minutes.
- **Economy:** Cost is only 10% of conventional lab methods.
- **Easy implementation:** Only 1 day of training is required.
- **Scalability:** Portable, with no set-up calibration required.
- **Accuracy:** Performance is comparable to reference lab methods.

iChecks are manufactured in Germany, used in over 80 countries and validated against standard laboratory methods. Learn more at www.bioanalyt.com/products.

