

ISOTOPE TESTING BREAKS NEW GROUND IN FOOD TECHNOLOGY

Identify the natural and anthropogenic properties of food, feed and related products with isotope testing.

WHAT IS AN ISOTOPE?

The term isotope is formed from the Greek roots isos (equal) and topos (place) meaning “the same place”. Thus, an isotope is one of two or more atoms of a single element which have an equal number of protons but contain different numbers of neutrons. This means that each isotope of a given element has a different mass, even though they occupy the same position in the periodic table.

Both stable and radioactive isotopes exist in nature. Stable isotopes are energetically stable and do not spontaneously decay, as opposed to radioactive ones. They can be measured using various Mass Spectrometry (MS) techniques, such as Isotope Ratio Mass Spectrometry (IRMS) or Inductively Coupled Plasma – High Resolution Mass Spectrometry (ICP-HRMS).

ISOTOPES IN RESEARCH

Stable isotopes, both at the natural abundance level and artificially enriched, are used for research in drug discovery, nutrition, energy (both nuclear and petrochemical), healthcare diagnostics, and key scientific studies in physics, chemistry, environmental science and materials science.

FOOD INDUSTRY INTEREST

Applications are now being developed to use these capabilities within the food industry to enhance research into plant growth and human nutrition.

Substances may bear a unique isotope ratio fingerprint, characteristic for the processes they undergo during their formation (e.g. photosynthesis) and/or subsequent environmental transformations (e.g. oxidation/reduction/evaporation), or anthropogenic activities (e.g. fraud).



Consequently, most natural products' geographic origin and exposure to natural and anthropogenic alterations can be identified through isotope testing. For example, the testing of naturally grown botanical and animal species or parts of them, allows the comparison and verification of geographical origin or natural vs. anthropogenic influences. Equally, this testing can be applied to water and minerals.

Animal species that have been living in different geographical regions and exposed to different environments can be identified. Upon investigation of old bones discovered in tombs dating back to the Neolithic times, it has even been possible to determine the areas in which our human ancestors travelled and lived.

This research has opened the testing industry's eyes to the potential use of this capability for more projects.

PRACTICAL APPLICATION

There are several practical applications for isotope testing. It is possible to relate the origin of hormones in meat to the natural production by the animal itself, to animal feeding, or to intramuscular injection. Milk and its products are tested to determine and verify the origin of cheese and butter products. Similarly, the origin of bottled water, or water used in production of various spirits can be verified. Fraudulent addition of ethanol to whiskey, brandies or wine can also be detected.

Geographic identification requires the mapping, drawing and testing of samples known to originate from specific locations. These results are then added to an identification matrix. Trials need to be conducted to demonstrate whether the data contained in such a matrix

delivers sufficient evidence to identify a claim of fraud. This applies to origin, drug discovery, chemistry and material science.

EXPERIENCE AND NEW APPLICATIONS

SGS is applying its expertise and experience in the mineral industry and the field of environmental testing to the challenge of extending isotope testing into consumer markets such as food and feed. We are starting to identify and record relevant product compositions and elements.

For further information on our isotope testing capabilities, contact:

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