

SmartNotes

QA

Are there official methods for food and beverage product origin, authenticity and label claims?

Standardized methods (or official international methods) exist for stable isotope analysis of food and beverage samples and are aimed at protecting product origin, authenticity and label claims. These official methods, alongside the analytical solutions, are listed in table 1.

These methods have been formalized to create standardized approaches to sample analysis between laboratories, allowing laboratories to obtain conclusive answers for consumers, manufactures and governmental bodies, pursuing food and beverage adulteration and fraud.

Food and beverage products have a fingerprint, a unique chemical signature that allows the product to be identified. To visualize this fingerprint, Isotope Ratio Mass Spectrometry (IRMS) can be used, which identifies the **isotope fingerprint** of the product. The isotope fingerprint in food and beverage products is region or process specific (Table 1), which means that products can be differentiated based on geographical region (cheese, coffee, sugar, fish and animal feeding areas, coffee, sugar), botanical processes (beans, seeds, olive oil, vanilla), soil and fertilization processes (fruits and vegetables) and fraudulent practices (sugar addition to honey, watering of wines and spirits). These processes can be traced using carbon, nitrogen, sulfur, oxygen and hydrogen isotopes, with their variations indicating the origin and history of food and beverage products.



Table 1. Official methods for isotope analysis using isotope ratio mass spectrometry.

Product	Official method	Isotope fingerprint	Sample	What does it address?	Analytical solution
Wine					
	OIV-MA-AS2-12	$\delta^{18}\text{O}$	Water	Adulteration, Geographical origin, Year of vintage	Thermo Scientific™ GasBench II System, Thermo Scientific™ Dual Inlet
	OIV-MA-AS312-06	$\delta^{13}\text{C}$	Ethanol, Wine must, Grape sugar	Adulteration, origin	Thermo Scientific™ EA IsoLink™ IRMS System, Thermo Scientific™ GC IsoLink II™ Interface for GC-IRMS
	OIV-AS312-07	$\delta^{13}\text{C}$	Glycerol in wines	Adulteration by addition of glycerol from C4 maize or Fossil sources	GC IsoLink II Interface for GC-IRMS, Thermo Scientific™ LC IsoLink™ Interface for IRM-LC/MS
	OIV-OENO 510-2013	$\delta^{13}\text{C}$	Acetic acid in wine, vinegar		GC IsoLink II Interface for GC-IRMS, EA IsoLink IRMS System
	OIV-OENO 510-2013	$\delta^{18}\text{O}$	Water in wine, vinegar	Adulteration, Geographical Origin, Year of Vintage	Thermo Scientific™ GasBench II System, Dual Inlet
Sparkling wine					
	OIV-MA-AS314-03	$\delta^{13}\text{C}$	CO ₂ in sparkling wine	Origin and authenticity of sparkling wine	GasBench II System, EA IsoLink IRMS System, GC IsoLink, Dual Inlet
Spirits					
	OIV-AS312-07	$\delta^{13}\text{C}$	Glycerol in spirits	Adulteration by addition of glycerol from C4 maize or Fossil sources	GC IsoLink II Interface for GC-IRMS, LC IsoLink Interface for IRM-LC/MS
Fruit Juice					
	EU – CEN 1995	$\delta^{13}\text{C}$	Sugars	Adulteration	GasBench II System, LC IsoLink Interface for IRM-LC/MS, GC IsoLink II Interface
	USA – AOAC 1981	$\delta^{13}\text{C}$	Sugars	Adulteration	GasBench II System, LC IsoLink Interface for IRM-LC/MS, GC IsoLink II Interface
	EU – CEN 1998	$\delta^{13}\text{C}$	Sugars and pulp	Adulteration	GasBench II System, LC IsoLink Interface for IRM-LC/MS, GC IsoLink II Interface
	EU – CEN 1995	$\delta^2\text{H}$ and $\delta^{18}\text{O}$	Water	Adulteration	GasBench II System, LC IsoLink Interface for IRM-LC/MS, GC IsoLink II Interface
	AOAC method 2004.01	$\delta^{13}\text{C}$	Ethanol (From Fermentation)	Adulteration	GasBench II System, LC IsoLink Interface for IRM-LC/MS, GC IsoLink II Interface
Fruit Juice (Concentrate)					
	AOAC 1992	$\delta^{18}\text{O}$	Water	Adulteration	GasBench II System, LC IsoLink Interface for IRM-LC/MS, EA IsoLink IRMS System
Honey					
	AOAC method 991.41	$\delta^{13}\text{C}$	C-4 plant sugars at concentration >7%	Adulteration of honey	EA IsoLink IRMS System
	AOAC method 998.12	$\delta^{13}\text{C}$	C-4 plant sugars at concentration >7%	Adulteration of honey	EA IsoLink IRMS System
Cheese					
	EU Reg 548/2011	$\delta^{13}\text{C}$	PDO	PDO Grana Padano	EA IsoLink IRMS System

Find out more at thermofisher.com/IRMSPeripherals

ThermoFisher
SCIENTIFIC