



**FOOD
SAFETY &
QUALITY**

Product defects IN FOOD

Because you care about consumers' health

 **MERIEUX**
NutriSciences



Product defects

In the food sector, even though products defects might not be dangerous for consumers, they can be **manifold and cause serious damage to the brand**.

Main product defects

- Foreign bodies
- Off-flavors
- Changes in texture and appearance; abnormal color and possible stains
- Microbiological contamination

Foreign bodies in food

Apart from microbiological contamination, a typical defect in food or packaged food is a foreign particle such as **hair, insects, bones, molds, fungi and crystallizations or sediments in liquid products**.

Mérieux NutriSciences uses **microscopy and spectroscopy technologies** – often used in combination – to detect foreign bodies. On the basis of the information they provide, other complementary analyses (such as GC/MS, HPLC, ICP, etc.) can be planned, both on the foreign particle and on food.

Optical microscopy	<ul style="list-style-type: none"> ■ Fast ■ Useful for big particles ■ Non-disruptive technique 	<ul style="list-style-type: none"> ■ Performed by experts
SEM (Scanning Electron Microscopy)	<ul style="list-style-type: none"> ■ High-resolution ■ Microanalysis ■ Non-disruptive technique 	<ul style="list-style-type: none"> ■ Complementary techniques also used in combination
EDS (Energy Dispersive Spectrometry)		
FT-IR (Fourier Transform Infrared Spectrometry)		

Off-flavours undesired tastes or smells

Off-flavors are undesired or unpleasant flavors to taste or smell; **they can be present in food and cosmetic products.**

Mérieux NutriSciences can tackle this issue through:

- **sensory analysis**, organoleptic evaluations performed by a panel of trained judges evaluating the defects
- **screening of aromatizing/volatile compounds**, in food (raw materials and finished products), flavorings, fragrances, essential oils and even in food packaging, with targeted or non-targeted analyses (depending on the specific issue)
- **off-flavor study in case of spoilage microorganisms** by traditional plating and identification (MALDI-TOF, 16S rRNA sequencing) as well as by metabarcoding



Changes in texture and appearance

Mérieux NutriSciences tackles changes in product appearance and in their rheological characteristics through the spectrophotometric analysis, physical-mechanical tests and microbiological analyses.

Texture	<ul style="list-style-type: none"> ■ Texturometer, dynamometric tests 	<ul style="list-style-type: none"> ■ Compressive strength test, perforation test, flexural strength test in 3 points, cutting and shearing tests ■ TPA (Texture Profile Analysis) simulating the chewing of soft products ■ Adhesiveness, chewing, etc.
Viscosity	<ul style="list-style-type: none"> ■ Brookfield viscometer ■ Capillary viscometer ■ Rheometer 	<ul style="list-style-type: none"> ■ Onv homogeneous food products in liquid form, or in granules/powder after proper preparation steps
Color	<ul style="list-style-type: none"> ■ Image analysis 	<ul style="list-style-type: none"> ■ To determine the product color and compare its stability during a shelf-life study
Stains or discolor	<ul style="list-style-type: none"> ■ MALDI-TOF and 16S rRNA sequencing or Metabarcoding 16S using targeted metasequencing ■ Chromatographic analyses (GC/MS, HPLC) ■ Spectrophotometric analyses 	<ul style="list-style-type: none"> ■ To determine the possible microbiological or chemical causes

The importance of the right approach

Mérieux NutriSciences Science Center

When dealing with a product defect, one of the first steps of the food industry is to discover the causes to avoid it from occurring again. Mérieux NutriSciences Science Center has a **team of dedicated experts**, a wide **portfolio of analytical solutions, forefront equipment and a long scientific experience**. These are the main strengths to propose the most suitable analyses and to give a reasonable and **sound answer to the problem**.

Transversal experience

Mérieux NutriSciences' **skills are multi-sectorial** and range from microbiology to chemistry; every food sector is covered, but specific knowledge in other fields – such as packaging, cosmetics, environmental, pharmaceutical, etc. – is also implemented to study product defects.

Wide range of analyses

The solution to a complex problem does not always imply a complex analysis or the development of a new method: the experience in the food sector allows Mérieux NutriSciences to **adapt existent analyses to new issues, thus optimizing sustainable investments** to propose global solutions.

High-level technologies

When a deep analysis is needed, **cutting-edge equipment** is available to perform high level tests in a highly skilled Research & Development department.

Flexibility

It is a **step-by-step approach** not only including standardized analytical plans, but also tailored offers and great dynamism during the study.

Detailed final report

It is a document containing the analysis and the comments on the issue; **it lists the results contextualizing them in a real manufacturing situation**.



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