



The Heracles e-nose role in the development and production of “reimagined” foods

2021 White Paper



Introduction

The innovation train carrying the new laboratory cultured and plant protein products has well and truly left the station and now providing retailers and consumers with an array of new and novel food product.

While manufacturers, retailers and consumers are looking for brand and lifestyle defining products, that provide consistent quality and flavor, the marketplace for these “new” protein products is becoming more competitive and attracting significant amounts of investment money. With these challenges and investments, the need for consistent quality as well as unique and innovative flavors becomes a business imperative.

This is combined with the “traditional” supply chain, certification, and regulatory challenges that are an everyday part of food production. To meet these goals, manufacturers need focused systems and procedures that deliver products that are safe and legal and consistently meet desired organoleptic sensory qualities



How can the Heracles electronic nose contribute to driving and hitting the flavors for “reimagined” foods?



Heracles can be the first part of R&D innovation as human panels and developers seek to understand and match “wild” or natural flavors, the instrument can be used to characterize the traditional flavor profile electronically as the target profile and objective QA bench-mark for future developments and innovations. Similarly, Heracles can be used to profile an existing “wild or natural” flavor or competitor’s product flavor and then use the analysis data to produce a complementary “product match”.

The Heracles instrument can be complementary to existing quality assurance systems including human panels to profile desired product specifications and apply saved E-nose models for daily QA/QC inspection. This way E-Nose testing supports traditional testing methods including organoleptical sampling along with recipe and batch controls for robust quality assurance and increased testing capacity from raw materials to final product.

Heracles provides scientific data and accompanying product flavor descriptors that can be compared against human panel observations to develop objective gold standards for products and materials. Quantitative chemical analysis and high capacity for many sample types make the E-Nose suitable for measuring oxidation in raw meat and other raw material or active functional ingredient applications unfavorable for human sensory panels.

When sourcing and validating ingredients and flavors that are critical to producing the “reimagined” products, Heracles can be used to source and specify supplier’s samples and then be used to validate vendors delivered batches before being released into the production processes. Raw protein materials prone to oxidation may also be monitored for price-point correlation and supplier quality and consistency.

Once production commences Heracles can have a role in validating the batches either pre-processing or post processing prior to packaging or filling to ensure correct flavor profile has been achieved.

Prior to packing and particularly prior to liquid filling, rinse water can be evaluated to ensure there is no cross-contamination with flavor carry-over from any previous batches.

Once packed or filled Heracles can play a role in shelf-life evaluations to ensure the original desired flavor is retained during the declared shelf-life of the product to ensure there is no flavor deterioration, oxidation, or packaging interactions taking place.

Post-production, delivery or sale, the Heracles can also be used to investigate challenges like consumer complaint or disputes between vendors and sellers. This can be in the form of comparing the specifications of the suspect profile to that of an agreed reference model for troubleshooting to identify the potential source or case of an off-note odor or flavor



How does the Heracles e-nose deliver results that drive consistency and quality?



The instrument combines dual fast gas chromatography detection with powerful data processing based on multivariate statistics the option of a module for sensory and chemical characterization – AroChemBase.

The heart of the Heracles is the flash gas chromatography capability providing run times 6 to 8 minutes. This is combined with high sensitivity, down to low ppb. High resolution and high compound identification accuracy.

One Heracles will add the capacity of 10+ human testers with a very high degree of precision - 99% efficiency vs 75% for human panels from study with a carbonated beverage manufacturer, as well as reproducibility. Heracles is providing additional favor assessment bandwidth to our clients.

The AroChemBase provides the sensory attributes of the compounds available for 3,700+ compounds and 550+ descriptors

The Heracles e-nose provides a powerful tool for sensory evaluations, R&D and quality assurance.

Conclusion

In bringing the Heracles instrument to complement existing quality systems Alpha MOS provides the following attributes:

- Trusted service partner for 25 years
- Global network
- Applications in all aspects of the supply chain – R&D, ingredients validation, batch qualification, final product, rinse water analysis as well as troubleshooting
- Rapid analysis results
- Chemical and attribute descriptors for sample results
- No equivalent technologies available
- A unique database that includes
 - + **142,000** compounds
 - + **3,700** characterised by more than **550** sensory attributes
 - + **1,800** with human smell detection thresholds.



Heracles can be instrument that provides that point of difference and consistency in this “reimagined” marketplace and as these products compete and differentiate themselves from traditional products