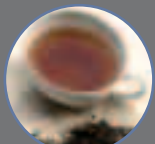


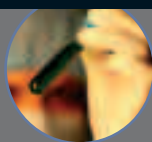
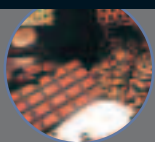


Product Development and Quality Control



Flavor & Odor Analyzers

Sensor Array Electronic Noses



- Fox
- Gemini



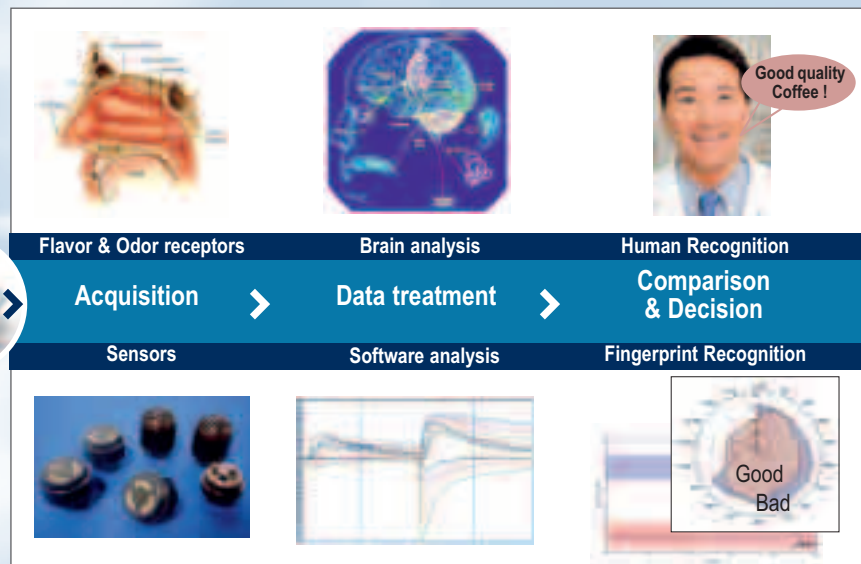
ELECTRONIC NOSES

Odor, a key product characteristic

- >> **Product development**
- >> **Shelf life analysis**
- >> **Evaluation of competitive products**
- >> **Quality Assurance & Control of raw materials, end products**
- >> **Selection of manufacturing process**
- >> **Work in process monitoring**

- Electronic Noses provide an electronic fingerprint instrument for detection, analysis and recognition of odors, aromas and all volatile substances.
- Due to the consistency of the results, databases can be created to accumulate and store qualitative and quantitative knowledge even on very elusive flavors.

Human sensing process

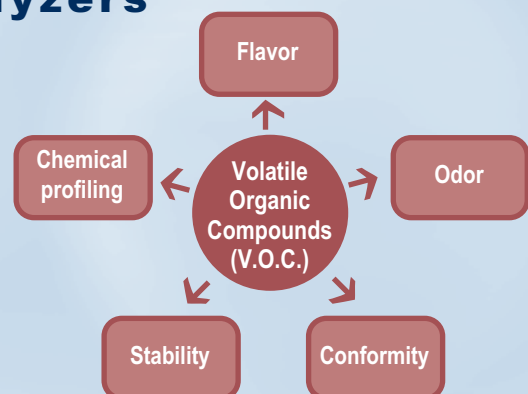


Electronic Nose process

More than Flavor & Odor Analyzers

Volatile substances provide a unique and very precise fingerprint of a product.

- If these volatiles are aromatic, they can be a prominent feature of the product and play a significant role in its market positioning.
- If the volatiles are odorless, they can still provide significant information about the conformity of raw material, final product, and process.



- >> **Monitoring volatile compounds means monitoring odor as well as quality, stability, conformity**

Why should I choose Electronic Nose Analyzers ?

■ Instrumental measurement

- ▶ Precise & accurate
- ▶ Objective
- ▶ Automated
- ▶ Available 24h / 7d
- ▶ Tireless

■ Fast

- ▶ No sample preparation
- ▶ Rapid analysis

■ Very sensitive

- ▶ Sensors allow the tracking of low ppb (part per billion) concentration

■ Convenient & Automated Maintenance

Automated sample preparation



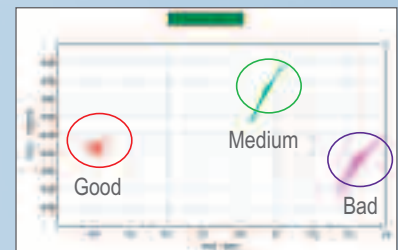
■ Easy to understand results

■ Comprehensive software to fit your specific needs

From one analysis and with one software, you will get:

- ▶ **Qualitative graph⁽¹⁾** to discriminate various qualities, origin of products
- ▶ **Odor unit⁽²⁾** to characterize product profile according to sensory attributes
- ▶ **Quantitative results⁽³⁾** to predict on-line flavor / odor intensity or chemical concentration
- ▶ **Quality control chart⁽⁴⁾** to visualize product conformity
- ▶ **Shelf life model** to study and compare the aging profile, the stability of raw materials or end products under various storage conditions

Qualitative graph (1)



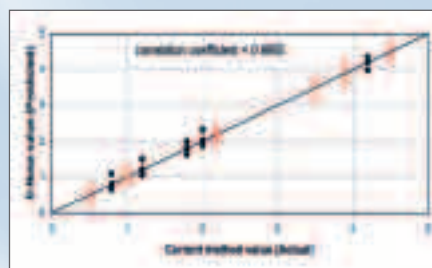
Principal Component Analysis - PCA.

Odor unit (2)



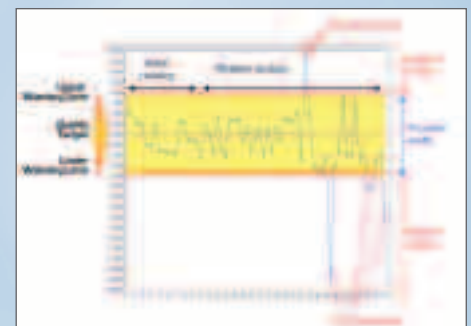
Sensor results showing olfactory intensity by sensory attribute (Radar Plot).

Quantitative Results (3)



This model allows the prediction of quantitative parameters such as concentration or sensory score. Reference samples are shown in red and unknowns in black (Partial Least Square - PLS).

Quality Control Monitoring (4)



If your new batch shows in the conforming area of the graph, it conforms to your standards; outside the band, the product has to be rejected (Statistical Quality Chart - SQC).

What are the benefits of Electronic Nose Analyzers ?

▶ **BETTER PRODUCT**

- Sharpen the knowledge of your products due to consistent databases of odors/flavors
- Improve your product range with the assessment of a larger number of formulations
- Develop formulations that better match market trends based on the ability to benchmark competitor's products
- Measure the consistency of your products over time, from one production site to another
- Select suppliers based on objective & accurate instrumental measurement

▶ **BETTER SENSORY PANEL METHOD**

Benefit from a fast screening of formulations prior to sensory panel.
Compare the results of both techniques to:

- improve panel reference scales (accuracy, precision)
- fine tune decision criteria
- simplify routine analysis



▶ **BETTER MANUFACTURING PROCESS**

- Improve the consistency of products
- Increase the number of controlled batches
- Analyze unpleasant, malodorous or toxic products
- Compare and select the production process that guarantees the best product
- Reduce variance in product evaluation
- Focus human resources on their primary tasks



▶ **BETTER MARKET POSITIONING & SALES**

- Portray company image as higher technology user
- Increase knowledge of competitive products
- Provide more rapid and quantitative response to customer complaints
- Obtain clearer Sales & Marketing tools for product consistency
- Certify product quality by olfactive / chemical fingerprint
- Launch new products earlier than competition



▶ **IMPROVED ROI (Return On Investment)**

- Reduce development time & expenses
- Decrease sensory cost
- Shorten the manufacturing flow
- Decrease inventory level
- Speed up market entry to generate more sales turnover

APPLICATION RANGE

› Raw materials, On process & final products, Packaging



Hundreds of companies

In Food, Beverage, Packaging, Pharmaceutical industries use Alpha M.O.S. expertise & instruments

Analysis Service & Electronic Nose Instruments

› R&D, Quality Control, Production

Laboratory Services Outsourcing

- ▶ Access to new technologies and special expertise not available in-house
- ▶ Analysis of specific or short term projects upon request
- ▶ Outsourcing of method development
- ▶ Development of tailor-made databases



- › ▶ **Reduce the time & cost required to develop and bring a new product to market**
- › ▶ **Relieve internal resource constraints**
- › ▶ **Convert fixed costs (personnel, expertise and facilities) into variable costs**

Two instruments

- ▶ Very sensitive
- ▶ Little or no sample preparation
- ▶ Results in minutes
- ▶ Available 24h / 7d

FOX - Formulation Development & Quality Control

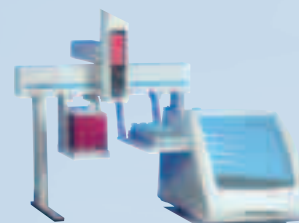
- Up to 18 sensors
- Complete software package
- Numerous applications
- Upgradable with Fingerprint Mass Spectrometry technology



FOX, the smart animal with very sensitive olfaction

GEMINI - Quality Control

- 6 sensors
- Software for process & product conformity checking
- Dedicated applications
- High analysis throughput (more than 200 analysis per day)



GEMINI, the Latin name for twins, to determine the product conformity with your reference, the "twin product"

Main system & service features

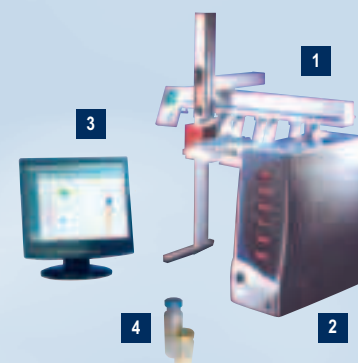
- ▶ **Headspace autosampler** **1**
(32, 64 or 96 samples) with numerous options:
 - SPME/SPDE/ITEX to increase selectivity & sensitivity
 - Large oven for sample volumes up to 750 mL
 - Petri dishes for bacteriological analysis

- ▶ **Electronic Nose unit** **2**
 - FOX 2000: 6 sensors
 - FOX 3000: 12 sensors
 - FOX 4000: 18 sensors
 - GEMINI: 6 sensors pre-selected according to your applications

- ▶ **Electronic Nose software** **3**
 - Autosampler and acquisition control
 - FOX: a complete multivariate statistics package
 - GEMINI: Quality Control chart
 - On-line visualization of results
 - Various maintenance tools: automatic system diagnostic, sensor diagnostic
 - Available in English, French, Japanese and other languages upon request

- ▶ **Consumables package included:** **4**
start-up kit (vials & diagnostic solutions)

- ▶ **Maintenance agreement**
(hardware, software & application)



- ▶ **Analysis features**
 - Repeatability: < 5% and < 1% in quantitative determination
 - Environmental conditions: ambient air from 10 to 25°C

- ▶ **Air generator recommended**

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