

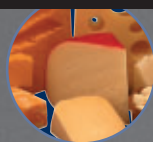


Cutting edge technology for taste development of formulation!

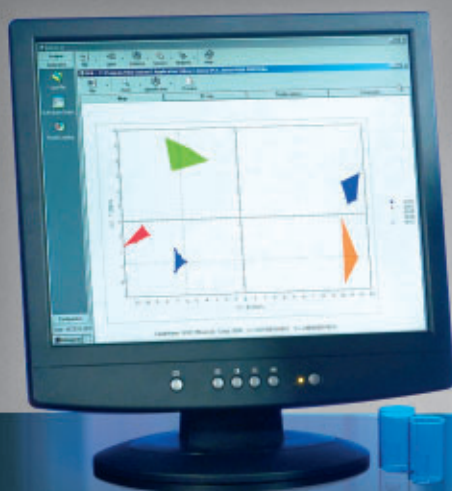


ASTREE > Electronic Tongue

Objective & Safe Taste Measurement - Fingerprint Liquid Analyzer



- > Food & Beverage
- > Nutraceutical & Pharmaceutical
- > Tobacco

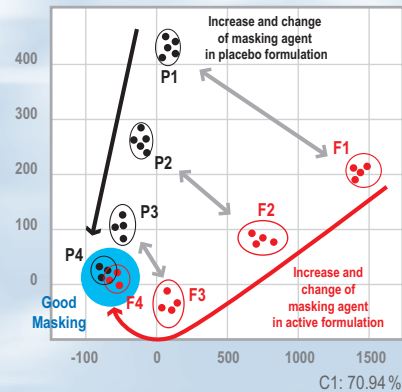


Taste Masking

- ▶ Optimize the taste masking efficiency of active (NCE / Nutraceutical) formulation even before safety assessment study
- ▶ Assess the impact on taste of every ingredient
- ▶ Measure the bitterness intensity and improve your formulation design / selection
- ▶ Enlarge your portfolio of choice of ingredients without a systematic use of sensory panel

> > **Improve your formulation for better consumer likings**

C2: 24.69% Discrimination index: 90



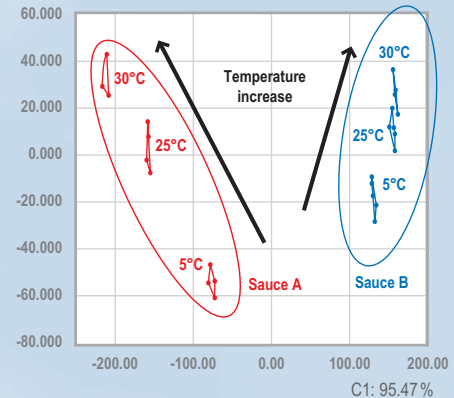
Comparison of formulation with active drug (F) and the corresponding formulation without active substance (placebo P). When the distance is reduced, the taste masking has been improved.

Shelf Life

- ▶ Analyze taste evolution and stability of oral formulations according to various storage conditions, time or packaging

> > **Efficiently compare the stability profile of various formulations under stress or natural ageing**

C2: 3.57% Discrimination index: 93



Comparison of taste evolution of 2 sauces A and B after 30 days of storage at three various temperatures: 5°C, 25°C and 30°C. Sauce B is more stable than sauce A.

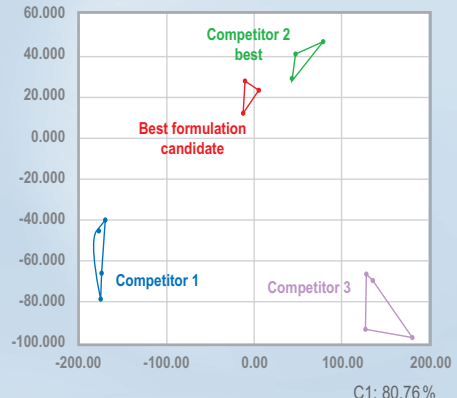
Taste Comparison

Compare various products:

- ▶ new and original formulations
- ▶ yours and competitors
- ▶ brand products & generics
- ▶ products from various origins ...

> > **Benchmark your competitors
Monitor quality of your suppliers
Compare your processes**

C2: 10.58% Discrimination index: 95



After comparing 3 marketed products, the formulation candidate selected will be the one closer to the more palatable competitive product.

What can the **Electronic Tongue** do for you?



- Develop products with consumer oriented taste
- Avoid consumer complains & re-development process
- Multiply taste screening & test more formulation candidates
- Build internal organoleptic expertise
- Save time and money by speeding up product development



Food & Beverages

- ▶ Mineral water
- ▶ Soda - fruit & vegetable juice
- ▶ Coffee - tea - chocolate
- ▶ Dairy products & milk
- ▶ Beer - wine - liquor
- ▶ Freezed dried soup - tomato sauce
- ▶ Salad dressing - vinegar ...



Nutraceuticals & Pharmaceuticals

- ▶ Tablets (coated, effervescent and dispersible ...)
- ▶ Lozenges
- ▶ Microgranules
- ▶ Powder
- ▶ Hard or Soft capsules
- ▶ Oral liquid solutions & syrups ...

Saltiness, Sweetness, Sourness, Bitterness, Umami Pungency, Spiciness, Astringency, Kukomi ...

- ▶ Taste masking efficiency
- ▶ Discrimination of origins
- ▶ Product stability testing
- ▶ Packaging migration monitoring
- ▶ Taste matching of gold reference
- ▶ Comparison with other products
- ▶ Bitterness masking efficiency
- ▶ Shelf life & ageing
- ▶ Placebo taste matching
- ▶ Quantification of additives & drugs
- ▶ Comparison with competitive products

Test products
- even non GRAS*
*Generally Recognized As Safe

21 CFR Part 11 Compliant

Analyze the flavor and taste of:

- raw materials
- standard or new formulations
- pilot, intermediate and final products

Electronic Tongue

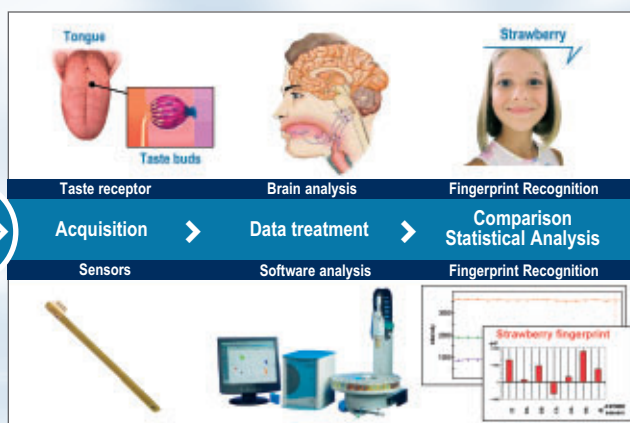
Working principle

Like the human tongue, the ASTREE Electronic Tongue performs a global analysis (fingerprint) of a complex dissolved organic or inorganic compounds mixture.

The sensor head (7 cross selective sensors) dips into the liquid sample to be tested.

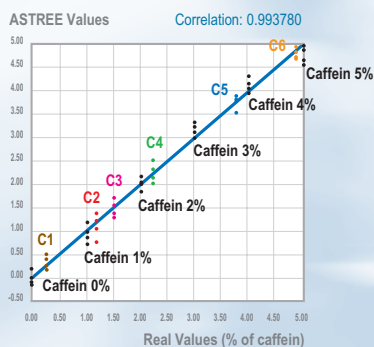
Manipulation are automatically executed thanks to the autosampler. Record of the sensor output is performed within 2 minutes and then analyzed by a complete chemometric software using multivariate statistics.

ASTREE Electronic Tongue has for all basic tastes a similar or better detection threshold than the Human Tongue.



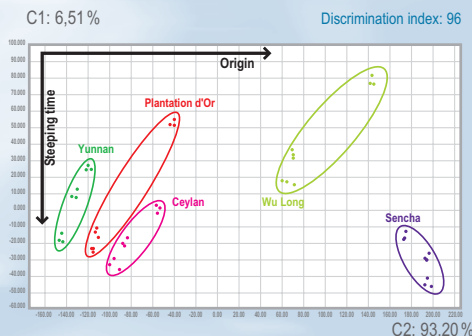
More results

Caffeine level prediction in coffees



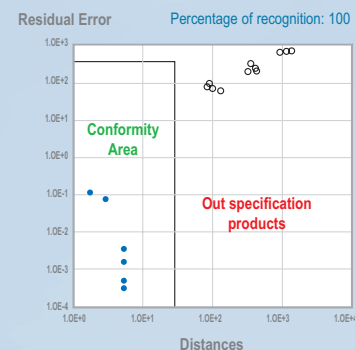
After building a predictive model (black spots), ASTREE can determine caffeine concentration in various coffees (C1 to C6) with a very good reproducibility.

Discrimination of tea (origin & steeping time)



- Yunnan (Black tea from China)
 - Plantation d'Or (Black tea from China)
 - Ceylan (Black tea from Sri Lanka)
 - Wu Long (Tea from Taiwan)
 - Sencha (Green tea from Japan)
- 3 steeping times
- 4 minutes
- 6 minutes
- 8 minutes

Beer freshness discrimination



After a training phase, the ASTREE is able to discriminate fresh beers from aged beers (from 3 to 5 months).

Main system specifications

▶ **Liquid Autosampler 1** with a carroussel capacity: 16 beakers (80 mL) or 48 beakers (20 mL), a programmable sample agitation, a robotic sensor head and individual connections for each sensor

▶ **Astree Electrochemical Sensor Array 2** including one reference electrode (Ag/AgCl) and 7 liquid cross selective sensors with 2 specific sets (Food & Beverage or Pharmaceutical industries).

▶ **Astree Electronic Tongue Unit 3** with sensor board (1 to 28 channels available), acquisition board (acquisition frequency 10 Hz), main board for data acquisition and power supply card (110-120 VAC, 220-240 VAC)

- External Input / output: RS232 connections
- Electronic Unit Dimensions (L x W x H): 26 x 30 x 100 cm - 66 x 76 x 254 inch
- Electronic Unit Weight: 25 kg

▶ **Astree Software V3.0 4** with autosampler and acquisition control, a complete multivariate statistics package (PCA, DFA, SIMCA, PLS) and various maintenance tools as automatic system diagnostic & sensor diagnostic



Multi-language software

▶ **Consumable Packages included: start-up kit** (beakers, diagnostic solutions), calibration solutions, **complete maintenance kit** (electrolyte, rinsing & diagnostic solutions, spare sensor set), **accessory kit**



Analysis features:

- Environmental Conditions: operating temperature constant $\pm 3^\circ\text{C}$
- Analysis Time 200s including:
 - Sensor acquisition: 120s
 - Rinsing time: 10s
- Precision: RSD $\leq 3\%$
- Sensibility and Accuracy: sensors sensitive and partially selective to chemical species - ionic and neutral.

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