



# Bitterness Masking Efficiency Testing

## Application to Pharmaceutical Oral Formulations

Results obtained at Alpha MOS Laboratory, Toulouse, France

Most drugs have a naturally bitter taste that can create an unpleasant sensation in the mouth or throat. The taste of the oral formulation can be a factor in the purchase of both OTC (Over The Counter) and Rx products. When introducing a new formulation to the market place, it is necessary to reduce the unpleasant bitterness with masking agents such as sugars, sweeteners or flavors. Until now the bitterness masking efficiency has been evaluated by a human sensory panel.

### Objective and Experimental Plan

This application note presents a new methodology to evaluate the bitterness masking efficiency with the Electronic Tongue Astree – Fast, objective and safe, it eliminates most of the need for human sensory panels.

To measure the efficiency of a formulation strategy, and to determine the best ratio of sweetener and masking agents, drug formulations with different concentrations and types of masking agents are produced with corresponding placebos (i.e. formulations without active drugs). Then both sets of samples are then quickly analyzed with little or no sample preparation to determine the effectiveness of the masking agent. The closer the placebo matches the formulation with drug, the better the taste.

### Samples

Drug (D) with all the excipients and a matching placebo (P) have been prepared. Five percentages of a masking agent have been added to both formulation candidates. In the following graph both the Drug (D) and the Placebo (P) samples are labeled by increasing the level of concentration from 1 to 5.

### Analytical Conditions

α Astree – an array of 7 sensors has been designed for use in the pharmaceutical industry. 7 sensors pre selected for the Pharmaceutical industry.

Sample volume used (ml)	100	Temperature	ambient
Time between 2 analysis (sec)	180	Acquisition time (sec)	120

### Method Repeatability

To determine the repeatability of the method, an RSD has been computed on the measurement for four replicates of a single sample. The results are presented in the table.

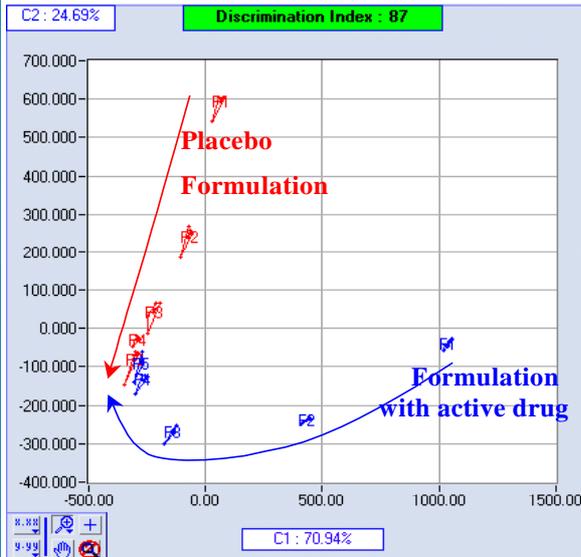
Based on the repeatability of the measurement, the method can be considered acceptable for use for the study.

Sensor	1	2	3	4	5	6	7
RSD	0.12	0.18	0.11	0.10	0.16	0.23	0.15

### Results representation

All the analyses have been presented on a PCA graph:

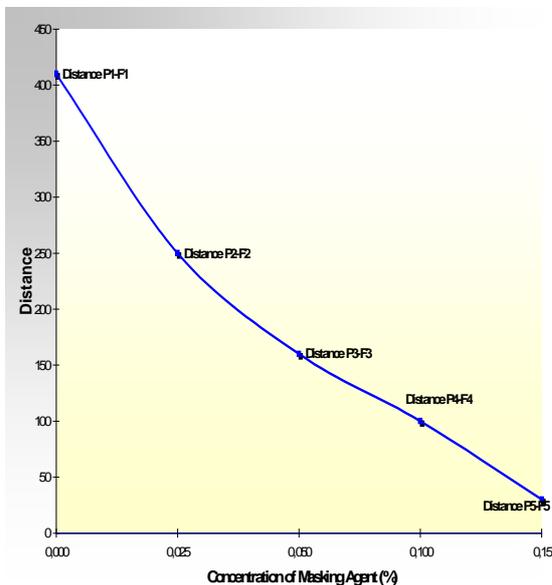
- The placebo formulations (i.e. without active drugs) are located in the left section of the graph
- The drug formulations are shown in the right section of the graph
- By varying the formulation the placebo and drug formulation converge at the same point identifying the formulations demonstrating the best similarity in taste.
- When there is no difference between the placebo and the drug formulation, the bitter taste has been masked. As the □ Astree is more sensitive than the human panel (in arrange of 10<sup>2</sup> for the bitter taste). The identified formulation will be correlated to the human ranking.



### Visualization of the masking agent efficiency

The distance between the placebo and drug formula decreases the more effective the taste masking.

In this example the lower distance between the drug and the placebo formulation is obtained with a concentration of 0.15% of this masking agent.



### Conclusion

The Astree Electronic Tongue can be used to quickly evaluate the effectiveness of a wide range of formulations and masking strategies. The results will provide the ability to identify which formula is the best tasting.

A wide range of drug formulations can be screened in minutes with the Electronic Tongue, compared to the number of formulations that can be screened with a human sensory panel in the same amount of time. Using the Astree provides laboratories valuable development time to get new products on into the market place with verifiable and reliable results. Make it right the first time!