

Results performed for Pedro Domecq Company

Context & Objective

Tequila is a famous alcoholic drink made from fermented and distilled sap of the agave. The blue agave is the only one allowed for tequila production. There are two categories: 100% agave Tequila and “mixtos” which legally can be mixed up to 51% with other ingredients and three types: Blanco (White - fresh from the still), Reposado (Aged - at least 2 to 12 months), Añejo (Extra-aged - at least one year).

In the 90's, the increasing tequila popularity caused a doubling of consumption, creating shortage of agave plants. At the same period, a spreading fungus affected up to 30% of all the plants, making them unsuitable for use in tequila. As a consequence, Tequila prices rose. Currently, some distillers produce and sell “mixtos” Tequila while pricing them at the 100% agave Tequila price.

In order to face with this very hard market environment, distillers need to determine easily and quickly the quality and the age of Tequila, to detect frauds or to benchmark with their competitors.



The objective of this study is to differentiate then recognize Tequilas with an electronic tongue, based on:

- the origin of agave and the percentage of agave used to make the beverage
- the process used
- the maturation stage
- the taste and flavor features.

ASTREE electronic tongue

The ASTREE Electronic Tongue (fig. 1) is based on liquid sensor array allowing a measurement of potential difference between each sensor and a reference electrode. Each sensor has a specific organic membrane, which interacts with chemicals present in the liquid sample in a specific manner. Recorded data are processed by the software as a global taste fingerprint.

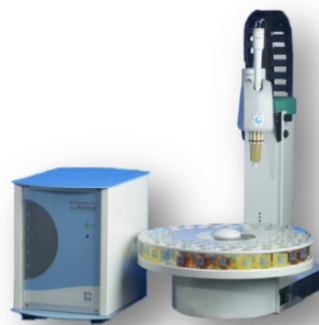


Fig.1: ASTREE Electronic Tongue (Alpha MOS, France)

Experimental Plan

Analytical conditions

Sample volume	100 mL	Temperature	Ambient
Time between 2 analysis	180 sec	Acquisition time	120 sec

Samples

Quantity	Type	Ageing	Quality	% of Agave	Labelling
2 batches	Blue Agave Tequila Brand 1	no maturing	Good	100	Blanco 01 & 03
2 batches	Blue Agave Tequila Brand 1	Reposado	Good	100	Reposado 04 & 05
2 batches	Blue Agave Tequila Brand 1	Anejo	Good	100	Anejo 04 & 05
2 batches	Not Blue Agave Tequila Brand 2	Reposado	Good	100	Fraud 1 & Fraud 2
1 bottle	Destilado de Agave Brand 3		Bad		A
1 bottle	Destilado de Agave Brand 5		Bad		C
1 bottle	Tequila Brand 6	Reposado	Good	100	D
1 bottle	Tequila Brand 8	Reposado	Very Good	51	F
1 bottle	Tequila Brand 9	Reposado	Very Bad	51	G

Ageing of Tequila

Objective: Rank Tequila according to the maturation stage.

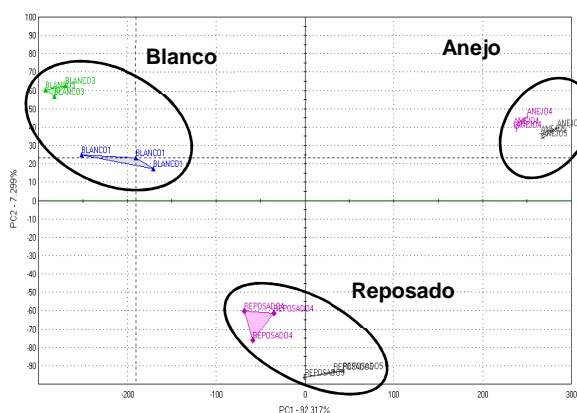


Fig.2: Tequila Maturation ranking with the ASTREE

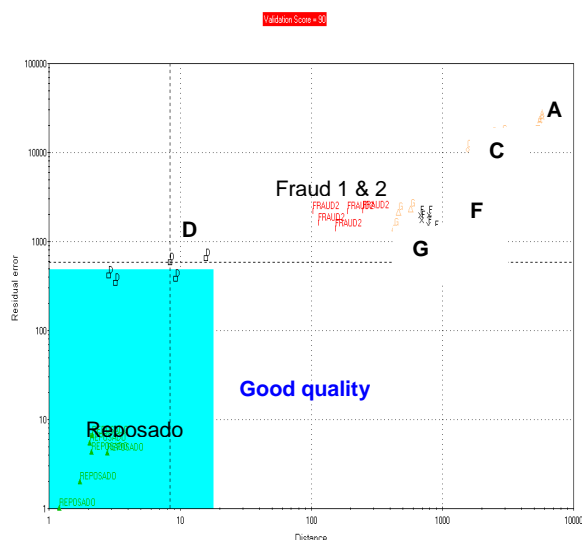
Conclusion

Thanks to automatic sampling system and data treatment, ASTREE Electronic sensing system gives immediate conclusion on Tequila spirit.

Alpha MOS Instruments are helpful to measure and compare the quality of tequila spirits for producers as well as for the Tequila Regulatory Council in detecting fraud Tequila produced with unapproved ingredients.

Quality Control with Electronic Nose and Tongue

Objective: Detect fraud and bad quality Tequila



ASTREE Electronic Tongue can:

- rank various tequila according to their ageing,
- differentiate bad and good sensory qualities,
- discriminate "mixto" and 100% Tequila,
- detect fraud from original Tequila.