

Electronic Nose for Evaluation of Tea

Electronic Nose is a smart instrument that is designed to detect and discriminate among complex odours using an array of sensors. E-Nose system primarily consists of four functional blocks, viz., Odour Handling and Delivery System, Sensors and Interface Electronics, Signal Processing and Intelligent Pattern Analysis and Recognition. The array of sensors is exposed to volatile odour vapour through suitable odour handling and delivery system that ensures constant exposure rate to each of the sensors. The response signals of sensor array are conditioned and processed through suitable circuitry and fed to an intelligent pattern recognition engine for classification, analysis and declaration. For black manufactured tea, an array of Metal Oxide Semiconductor (MoS) sensors have been used for assessment of volatiles.

E-Nose for Finished Tea Classification:

Flavour and Aroma are important quality attributes of finished tea. Human experts – called “Tea Tasters” – conventionally determine tea quality. Tea tasters usually assign scores to samples of tea under evaluation in a scale of 1 to 10 depending on the flavour, aroma and appearance of the sample. Electronic Nose is a unique tool that is capable of sensing the volatile compounds of the tea sample and reliably predicts Tea Taster like scores with a high degree of accuracy. Neural Network based Soft Computing Techniques are used to tune near accurate co-relation smell print of multi-sensor array with that of Tea Tasters’ scores. The software framework has been designed with adequate flexibility and openness so that tea planters themselves may train the system with their own system of scoring so that the instrument will, then on, reliably predict such smell print scores.

In addition, encouraging results have also been obtained during the preliminary experimentations with Withering Process to expect Electronic Nose also to be an useful instrument for determining the optimum Withering time.

E-Nose for Assessment of Optimum Fermentation Time:

Conventionally, length of fermentation is subjectively estimated by human senses of smell and vision. Human experts can sense conversion of grassy smell to floral smell of in-process leaves after fermentation. But, such odour emanation travels through cycles of so called “First Nose” and “Second Nose” etc. A colorimetric approach is also used at times where fermentation completion time is determined based on colour.

A specially designed Electronic Nose has been successfully used to monitor volatile emission pattern in fermentation process over passage of time. Through prolonged experimentation with various clones, fermentation processes and climatic variations, it has been established that smell changes during the process may be reliably detected repeatedly by Electronic Nose. Even the smell peaks during so called “First Nose” and “Second Nose” may also be clearly detected with this new smart instrument.

