ELECTRONIC NOSE – MULTISENSORY SYSTEM FOR IDENTIFICATION OF JUISESAND JUISE PRODUCTS, DETERMINATION OF SAFETY AND GUALITY

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Totally, juices, fruit drinks, nectars, juice drinks are traditionally in great demand among people.Forgery of fruit juices generates huge benefits to producers and is widespread not only in Ukraine, but throughout the world. The development of criteria and methods of identification of food products is very topical on the domestic and foreign market today.

Yardsticks of juice identification can be divided into two groups: sensory and physical and chemical [1].

Sensory characteristics are traditional in control of food products. Trained human sensory panels are often employed for evaluating quality parameters, but this approach suffers from some known drawbacks, such as lack of reliability due to human fatigue or stress and requiring time for training and expenditures; that makes them unsuitable for routine industrial controls.

Aroma is one of the most significant parameters among the sensory properties of fruit derivates. The volatile compounds of any food product are not only able to give information about its typical flavour, but also to act as product and process markers.

The presence of microbial contaminants is still a severe problem heavily striking several aspects of the food chain: first of all, they are not only related to health risks for customers but also cause organoleptic alterations of final products resulting in economic damages for producers. Indeed, some of compounds can be the outcome of chemical processes involving the main compounds of the food, as a result of technological treatments or caused by the product storage. Unwanted smells, the so-called «off-flavours» may also include substances originating from the metabolism of spoilage microorganisms such as moulds and bacteria which may accidentally contaminate the fruit products [2].

According to DSTU 4283.2:2007 juices and nectars can contain only natural fruit flavors and share of juice or fruit puree in fruit nectars must be not less than 25-50%.

One common falsification is now replacing of natural flavors derived from specified raw material for artificial mixture of several chemical compounds of different origin (identical to natural or resin-based).In addition, the common practice is to add individual key and odor-active substances of resin-based origin (e.g. linalool), to upgrading the flavor of the natural product[3].

Traditionally, gas-chromatography (GC) and mass-spectrometry(MS) are used to determine the aroma components of food samplesand identification of juices and juice products. These methods provide accurate measurements of the volatile fraction and allow defining the exact chemical nature of

aroma compounds. These hyphenated techniques are also useful for identification of off-flavours compounds caused by chemical or microbiological contamination of foods. Nevertheless, these methods still remain rather complex and expensive, being more suitable for laboratory quality control than for routine industrial analyses, which often require faster, simplier, and massive screening of large product batches.

The development of alternative or supporting methods for sensory panels for objective quality and safety control of food products in a rapid and consistent manner is very attractive to food industry [4].

Electronic noses (ENs) are instruments based on an array of semi low selective sensors and pattern recognition methods. An indicator consists of three main units: the system of sampling, matrix of sensors and data-processing unit[2, 3].

As reported in key review papers [2-4], the EN technology emerged in the last decade as a valid approach for evaluating food aroma due to its simplicity of use, low cost, good correlation with sensory panel, and the ability, once trained, to be used for continuous at-line quality control of products.

So, using an electronic nose you can develop methods and techniques for: testing quality and degree of spoilage of juices and other food products, raw material, objective quantitative assessment of the degree of smell, flavor expression, estimating the presence of resin-based flavors or toxic substances; identification of analysis patterns; control of food production process, rapid screening of early damage; defining the level of emission of volatile substances from nonfood matrices (plastics, packaging, paper, etc.).

References:

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