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## **Analysis of the applicability of electrical characteristics for the quality assessment of selected fruit and vegetable juices**

### **Abstract**

The growing awareness of consumers about the health-promoting properties of fruit and vegetable juices affects the continuous increase in their consumption. It is important, therefore, that the juices available on the market are of high quality. International regulations indicate what additives and in what concentration can be added to juices. However, producers often do not respect these recommendations, in particular the addition of sweeteners. Methods of quality assessment of juices based on measurements of chemical parameters are time-consuming, expensive and require specialized equipment. Therefore, alternative methods for assessing the quality of juices are still developed. Measurements of electrical characteristics can be such methods. In this work the possibility of using impedance, dielectric loss coefficient and relative permittivity for the detection of selected additives in apple juices (from Ligol and Champion apples), carrots (from the Bangor and Napoli carrots) and tomato (from Gargamel and Lima tomatoes) was analyzed. Analysis of the results showed that selected electrical parameters can be used to detect additives. They must be measured in a fairly narrow frequency range, characteristic for each kind of juices. This is 1.1 kHz - 5.1 kHz for apple juice, 4 kHz - 16 kHz for carrot juice and 510 Hz - 2.6 kHz for tomato juice. The largest possible application of electrical parameters was found in the case of carrot juice, it can detect the addition of water, vitamin C and salt based on measurements of the real part of impedance. In all juices an addition of sweeteners can be detected based on the measurement of the real part of impedance if the additive is at least 20% for apple juice and at least 8% for carrot and tomato juice. The dielectric loss coefficient may be potentially useful for detection of sweeteners addition in apple and carrot juices, however, for this parameter the additive concentration must be higher than for the real part of impedance. In juices, which are less sweet, the addition of sweeteners that can be detected by means of electrical parameters is lower.