

The Differential Degree Test: a Novel Methodology for Electronic Tongue Applications

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A novel methodology for electronic tongue applications based on the differential degree test was proposed in this study. Five basic tastes, namely, sour, sweet, bitter, salty, and umami, were detected by a novel voltammetric electronic tongue. Results proved that the differential degree test is applicable to intelligent instruments, and the D_d (differential degree) value was confirmed to be the most useful to distinguish the differences between samples quantitatively. At the same time, the theoretical foundation for electronic tongue applications was advanced. The D_d value is proportional to the logarithm of concentration ($r > 0.98$), and the sensors' responses to the stimulus were similar to Fechner's law in the field of psychophysics. On the basis of these results, the D_d value was applied for the quantitative distinction of Chinese rice wine of different ages (1, 3, 5, and 8 years); the D_d value increased with age. In addition, the changing quality of an orange juice beverage was indicated by the D_d value; the electronic tongue proved useful in quality control.

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