Calculation of Retention Indices of Essential Oils with the aid of the Van den Dool and Kratz equation and Bézier Curves

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Abstract

The aim of this article is to study the relationships and models among the Van den Dool and Kratz equation, the gas chromatography, and the Bézier curves constructed by aid of the Bernstein polynomials. Another aim of this article is to introduce open problems that contribute to real-world problems involving mathematics, chemistry, and plant biology, including the Van den Dool and Kratz equation, the gas chromatography, and Bézier curves. Searching for the solutions of these problems may have qualities that will create the potential that can enter the field of study of many researchers. As a result of these goals, the usability of Bézier curves was investigated while determining the chemical composition of essential oil obtained from P. Aladaghensis Leblebici. By applying the retention index from the Van den Dool and Kratz equation and evaluating chemical compositions of the essential oil are characterized by gas chromatography-mass spectrometry (GC-MS). The Van den Dool and Kratz equation results have the potential to be used not only in the chemical compositions of the oils, but also in applied mathematics and other fields. Moreover, we construct a new special finite sum. A lower bound and inequality are also given for the finite special sum involving the dead time associated with the isocratic step. Some applications and criticisms are given that include this lower bound and inequality for these sums and its effects on the chemical compositions of essential oil and the Van den Dool and Kratz equation.

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