

Gc-ms Data Integrated Chemometrics for the Authentication of Vegetable Oil Brands in Minna, Niger State, Nigeria

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Abstract : Vegetables oils are widely consumed in Nigeria. This has led to competitive manufacture of various oil brands. This leads increasing tendencies for fraud, labelling misinformation and other unwholesome practices. A total of thirty samples including raw and corresponding branded samples of vegetable oils were collected. The Oils were extracted from raw ground nut, soya bean and oil palm fruits. The GC-MS data was subjected to chemometric techniques of PCA and HCA. The SOLO 8.7 version of the standalone chemometrics software developed by Eigenvector research incorporated and powered by PLS Toolbox was used. The GCMS fingerprint gave basis for discrimination as it reveals four predominant but unevenly distributed fatty acids: Hexadecanoic acid methyl ester (10.27- 45.21% PA), 9,12-octadecadienoic acid methyl ester (10.9 - 45.94% PA), 9-octadecenoic acid methyl ester (18.75 - 45.65%PA), and Eicosanoic acid methyl ester (1.19% - 6.29%PA). In PCA modelling, two PCs are retained at cumulative variance captured at 73.15%. The score plots indicated that palm oil brands are most aligned with raw palm oil. PCA loading plot reveals the signature retention times between 4.0 and 6.0 needed for quality assurance and authentication of the oils samples. They are of aromatic hydrocarbons, alcohols and aldehydes functional groups. HCA dendrogram which was modeled using Euclidian distance through Wards method, indicated co-equivalent samples. HCA revealed the pair of raw palm oil brand and palm oil brand in the closest neighbourhood (± 1.62 % A difference) based on variance weighted distance. It showed Palm olein brand to be most authentic. In conclusion, based on the GCMS data with chemometrics, the authenticity of the branded samples is ranked as: Palm oil > Soya oil > groundnut oil.

Keywords : vegetable oil, authenticity, chemometrics, PCA, HCA, GC-MS

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