

ABSTRAK

ANALISIS KEMOMETRIK KEMURNIAN AIR ZAMZAM YANG BEREDAR DI PASARAN BANDAR LAMPUNG MENGGUNAKAN METODE *Principal Component Analysis* (PCA) DAN *Partial Least Square* (PLS) BERBASIS DATA SPEKTROFOTOMETRI FTIR

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Dalam penelitian ini dilakukan analisis kadar kemurnian air zamzam di pasaran Bandar Lampung menggunakan metode analisis statistik kemometrik, *Principal Component Analysis* (PCA) dan *Partial Least Square* (PLS) berbasis data spektrofotometri *Infrared*, dan metode pendukung lainnya metode MPAES, serta pengukuran nilai TDS. Spektra FTIR air zamzam murni dan air zamzam campuran menunjukkan bahwa adanya vibrasi ulur dari ikatan O-H pada daerah gugus fungsi dengan bilangan gelombang $3700-3100\text{ cm}^{-1}$ dan vibrasi tekuk dari ikatan H-O-H pada daerah sidik jari pada bilangan gelombang 1640 cm^{-1} , pola serapan nya identik dan hanya berbeda pada nilai kuantitatif absorbansi, dimana air zamzam lebih rendah dibandingkan dengan air jenis lain. Hasil analisis PCA data gabungan dari nilai FTIR, MP-AES, dan TDS menunjukkan bahwa adanya perbedaan pola, dimana sampel A hampir berdekatan dengan pola air zamzam murni, dan sampel lain berdekatan dengan pola air mineral. Hasil prediksi metode PLS menunjukkan Kadar campuran air mineral dalam air zamzam yang beredar di pasaran Bandar Lampung adalah sebesar 35% hingga 55%.

Kata Kunci: Air zamzam, FTIR, Kemometrik, MP-AES, PCA, PLS, TDS

ABSTRACT

CHEMOMETRICS ANALYSIS THE PURITY OF ZAMZAM WATER DISTRIBUTING IN THE BANDAR LAMPUNG MARKET USING *Principal Component Analysis (PCA) AND Partial Least Square (PLS)* METHODS BASED ON FTIR SPECTROPHOTOMETRY DATA

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In this research, analysis the purity of zamzam water in the Bandar Lampung market was carried out using chemometric methods, Principal Component Analysis (PCA) and Partial Least Square (PLS) based on Infra red spectrophotometry data, and other supporting data are MPAES data, and TDS values. The FTIR spectra of pure Zamzam water and mixed Zamzam water show that there are stretching vibrations of the O-H bonds in the functional group region with wave numbers $3700-3100\text{ cm}^{-1}$ and bending vibrations of the H-O-H bonds in the fingerprint region at wave numbers of 1640 cm^{-1} , the absorption pattern is identical and differs only in the quantitative value of absorbance, where Zamzam water is lower compared to other types of water. The results of the combined PCA data analysis of FTIR, MP-AES, and TDS values show that there are different patterns, where sample A is almost close to the pure Zamzam water pattern, and the other samples are close to the mineral water pattern. The prediction results of the PLS method show that the mineral water mixture content in Zamzam water circulating on the Bandar Lampung market is 35% to 55%.

Keywords: Chemometrics, FTIR, MP-AES, PCA, PLS, TDS, Zamzam water