

Evaluation of Oxidative Changes in Soybean Oil During Shelf-Life by Physico-Chemical Methods and Headspace-Liquid Phase Microextraction (HS-LPME) Technique

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Abstract : In this study, the oxidative stability of soybean oil under different storage temperatures (4 and 25 °C) and during 6-month shelf-life was investigated by various analytical methods and headspace-liquid phase microextraction (HS-LPME) coupled to gas chromatography-mass spectrometry (GC-MS). Oxidation changes were monitored by analytical parameters consisted of acid value (AV), peroxide value (PV), p-Anisidine value (p-AV), thiobarbituric acid value (TBA), fatty acids profile, iodine value (IV), and oxidative stability index (OSI). In addition, concentrations of hexanal and heptanal as secondary volatile oxidation compounds were determined by HS-LPME/GC-MS technique. Rate of oxidation in soybean oil which stored at 25 °C was so higher. The AV, p-AV, and TBA were gradually increased during 6 months while the amount of unsaturated fatty acids, IV, and OSI decreased. Other parameters included concentrations of both hexanal and heptanal, and PV exhibited increasing trend during primitive months of storage; then, at the end of third and fourth months a sudden decrement was understood for the concentrations of hexanal and heptanal and the amount of PV, simultaneously. The latter parameters increased again until the end of shelf-time. As a result, the temperature and time were effective factors in oxidative stability of soybean oil. Also intensive correlations were found for soybean oil at 4 °C between AV and TBA ($r^2=0.96$), PV and p-AV ($r^2=0.9$), IV and TBA ($r^2=0.9$), and for soybean oil stored at 4 °C between p-AV and TBA ($r^2=0.99$).

Keywords : headspace-liquid phase microextraction, oxidation, shelf-life, soybean oil

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