

Comparison of Peroxide Value, Oil Stability Index and Chemiluminescence Oxidation Induction Time of Sunflower Oil

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Lipid oxidation is a main factor in lowering oil quality. In the present study peroxide value and oil stability index was compared to a new chemiluminescence method. Chemiluminescence refers to luminescence based on chemical reaction. During decay of peroxide radicals excited electrons relax into their thermodynamically preferred state which result in the emission of light. Emitted photons are counted by a photomultiplier tube.

Commercial sunflower oil and high oleic sunflower oil were submitted to an accelerated ageing process by storing the samples at 85°C during 0.5, 1, 1.5, 2, 6, 24 and 48 h. Peroxide value and oil stability index were analyzed directly after ageing. For chemiluminescence (CL) method 10µl of a sample was measured under synthetic air in a basic instrument from ACL Instruments (Switzerland) at isothermal conditions (130°C).

As expected high oleic sunflower oil had a lower peroxide value and a higher oil stability index (OSI) than common sunflower oil.

For high oleic sunflower oil the oxidation induction time (OIT) measured by CL decreased from 4.8 h for untreated oil to 2.2 h after 48 h of ageing. Common sunflower oil was more susceptible to oxidation, thus OIT was at 1.5 h for untreated oil and 0.9 h after 48h of treatment.

Peroxide value and OIT (CL) showed high correlations for both sunflower oil ($R^2 = 0.94$) and high oleic sunflower oil ($R^2 = 0.97$). Oxidation stability index and OIT were also comparable. There is a high potential of chemiluminescence in measuring oil quality as the results are highly correlated to peroxide value and the sample preparation is very simple.