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Technical Bulletin

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Oil Stability Index (OSI) is an American Oil Chemists Society (AOCS) approved method that determines the relative resistance of fat and oil samples to oxidation. It replaces the outdated AOM (Active Oxygen Method), which was more labor intensive, required chlorinated solvents, and was generally not performed in a consistent manner from laboratory to laboratory.

All fats and oils are prone to oxidation. The rapidity of oxidation depends on the degree of unsaturation, the presence of antioxidants, and prior storage conditions. In the OSI analysis, the rate of oxidation is slow until any resistance to oxidation is overcome. This time is known as the oxidation induction period. After the induction period, the rate of oxidation increases dramatically.

Unlike peroxide value and free fatty acid analyses which give an idea of how good or bad an oil is at a particular time, the OSI analysis has predictive value. OSI can be used to compare various oils to predict their respective shelf lives. The OSI analysis can also be used to evaluate the effectiveness of antioxidants or determine how much longer a frying oil can be used before it goes bad.

SCOPE

The OSI method is applicable in general to all fats and oils. The most common oils analyzed are refined plant oils (i.e. Soybean, Palm, Peanut, Sunflower, Corn, Coconut, and Canola). The OSI times can range from less than two hours to over 100 hours. However, for samples susceptible to rapid oxidation, (OSI times <3h), the method's precision is decreased compared to more stable samples.

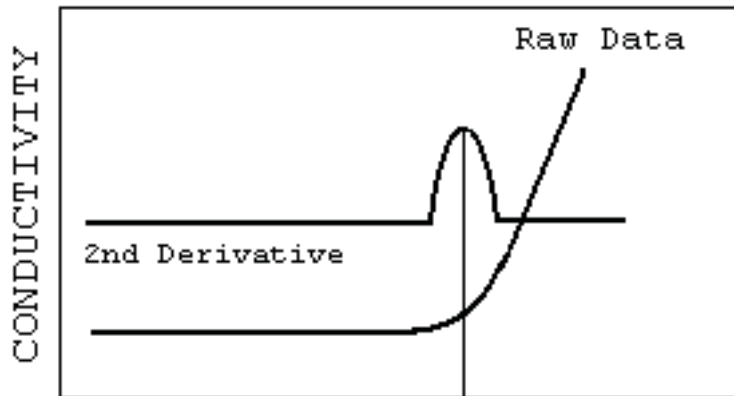
Typical OSI Times for Miscellaneous Oils*

<u>Refined Oil Type</u>	<u>OSI Time @ 110° C (Hours)</u>	<u>AOM Time</u> <u>(Calculated from OSI Time)</u>
Sunflower	3-6	6.8-14.0
Soybean	4-12	9.2-28.6
Corn	9-15	21.3-35.9
Palm	20-30	48.0-72.2
Misc. Shortening	25-70	60.1-169.1

*Hydrogenation and the use of antioxidants can substantially increase these times.

ASSAY PRINCIPAL

A 5.0g sample of oil or melted fat is weighed into a disposable glass test tube. The test tube is then placed in a heating block at a temperature of 110°C. Clean, dry air is bubbled through the sample, and the effluent stream of air is bubbled through a collection tube filled with ultra pure water. An electrode is placed in the water, and the instrument monitors the conductivity. As the oil oxidizes, volatile organic acids are given off, trapped in the collection tube, and increase the conductivity of the water. The instrument generates a plot of conductivity vs. time, and determines the inflection point in the conductivity curve. This inflection point is defined as the OSI time. A mathematical conversion can be used to convert the OSI time into a corresponding AOM time.



REFERENCES

Official Methods of Analysis of AOCS, Cd 12b-92, "Oil Stability Index"

"Collaborative Study of the Oil Stability Index Analysis". Tod A. Jebe, Mark G. Matlock and Ronald T. Sleeter. JAOCS, vol. 70, #11, pp1055-1061, 1993

Oxidative Stability Instrument Owner's Manual, Omnion, Inc., 8/99

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