

Analysis

Preserving mid-oleic Sunflower frying oil with FRY AntiOx+ and potato chips

Analysis methods

Measuring polar compounds is one of the indicators of the fryer oil's degradation.
 Therefore, the polar compounds rate in the oil reflects its level of deterioration and of triglycerides dissociation, thus indicating the fried food level of safety. It is measured through a probe tester in the fryer oil.
 Per EU regulation, a maximum of 25% of polar compounds in fryer oil is authorized.
 Beyond that level, the oil is not edible, as it has become toxic.

The free fatty acids (FFA) are more prone to oxidation and to turning rancid. Thus, FFA is a key feature linked with the quality and commercial value of oils and fats.
Maximum amount authorized is 0.6%.

Analysis methods

Measuring the peroxide value is the usual method to evaluate the primary oxidation level of the unsaturated fatty acids in fat. It indicates the milliequivalent of active oxygen contained in 1kg of vegetable oil. The higher the level, the more the fat is oxidized.

The p-Anisidine index quantifies the amount of aldehyde compounds. At high temperature, they trigger a fryer oil secondary oxidation. The higher the index, the more the oil is oxidized

Acetaldehyde belongs to the family of aldehydes. It is a toxic substance classified as most likely cancerous for human being. Analyzing it through HPLC determines the level of danger of the oxidized oil.

Protocol

• Treating the mid-oleic sunflower oil with tocopherol, and with FRY AntiOx+ (800ppm). Control sample : same with no preservative Heating at 175°C • Measuring the TPM rate at t_0 : oil reaches 175°C and 1st frying starts. Weight ratio: Chips 1/oil 10 3 After 42 fryings, heating without food at 175°C Measuring TPM 5 • Analyzing the Free Fatty Acid 6 Analyzing the peroxide value Tests are stopped when TPM rates in all samples reach the maximum authorized level of 25% 8

Oxidation kinetics of mid-oleic sunflower oil with potato chips – 175°C



Number of fryings /Time (minutes)

Graph 1: Oxidation kinetics in mid-oleic sunflower oil with chips -175°C- TPM

The control sample reaches the maximum amount of 25%TPM at 720 min. The oil treated with tocopherol reaches the maximum TPM level after 840 min. The oil treated with FRY AntiOx+ reaches 25% TPM after 900 minutes, 60 minutes later than with tocopherol and 180 minutes later than the control sample.

Oxidation kinetics of mid-oleic sunflower oil with potato chips – 175°C



Number of fryings /Time (minutes) Graph 2 : Oxidation kinetics in mid-oleic sunflower oil with chips -175°C- FFA

At around 700 min, the control sample reaches 0.6%, the maximum authorized. The oil treated with the tocopherol reaches the same level at around 750 min. The oil treated with FRY AntiOx+ reaches 0.6% at 840 min.

Oxidation kinetics of mid-oleic sunflower oil with potato chips – $175^{\circ}C$

PEROXIDE VALUE RESULTS



Number of fryings /Time (minutes)

Graph 3 : Oxidation kinetics in mid-oleic sunflower oil with chips - 175°C - Peroxide value

The peroxide value of the treated oil remains lower than the control sample throughout the kinetics of oxidation.

The oil treated with FRY AntiOx+ remains more than 2 times lower than the control sample after 720 min, and around 2.5 times lower than the one treated with tocopherol after 840 minutes.

CONCLUSION

The treatment of the oil with Tocopherol or FRY AntiOx+ showed a great improvement in the quality of Sunflower mid-oleic frying oil, with FRY AntiOx+ at 800ppm having the best results, allowing to gain:

- 20 to 25% of the frying time of the oil versus the non treated oil
 - 7 to 12% versus the oil treated with tocopherol