Application Note AN-R-030

Oxidation stability comparison of AOCS Cd 12b-92 and EN ISO 6886

No difference found between Metrohm method and norms

The two most commonly used norms for determining the oxidation stability of animal fats and vegetable oils are AOCS Cd 12b-92 and EN ISO 6886. The standard method recommended by Metrohm for this is based on EN ISO 6886.

This Application Note describes the determination and comparison of the oxidation stability of sunflower oil according to AOCS Cd 12b-92, EN ISO 6886, and the recommended method from Metrohm with an 892 Professional Rancimat.

Despite different parameters of the norms and the Metrohm method, it is shown that there is no significant difference found between the results of these experiments.

SAMPLE AND SAMPLE PREPARATION

The sunflower oil sample is measured directly with the Rancimat without any preparation steps.

EXPERIMENTAL

For analysis, an appropriate amount of the raw sunflower oil is weighed into the reaction vessel and the analysis is started.

With the Rancimat method, the sample is exposed to an airflow at a constant temperature of 100–180 °C (Figure 1). Highly volatile secondary oxidation products are transferred into the measuring vessel with the airflow where they are absorbed in the measuring solution. Here, the conductivity is continuously registered.

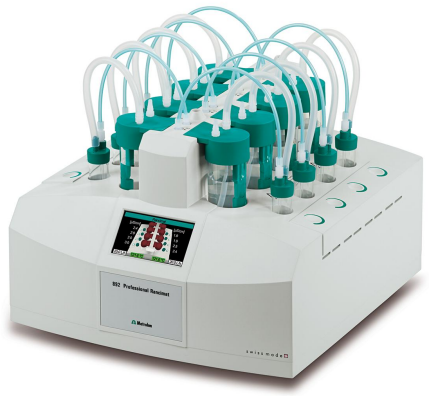

Figure 1. 892 Professional Rancimat equipped with measuring and reaction vessels for the determination of oxidation stability.

The formation of secondary oxidation products leads to an increase in the conductivity. The time until occurrence of this marked conductivity increase is referred to as the «induction time», which is a good indicator for the oxidation stability (Figure 2).

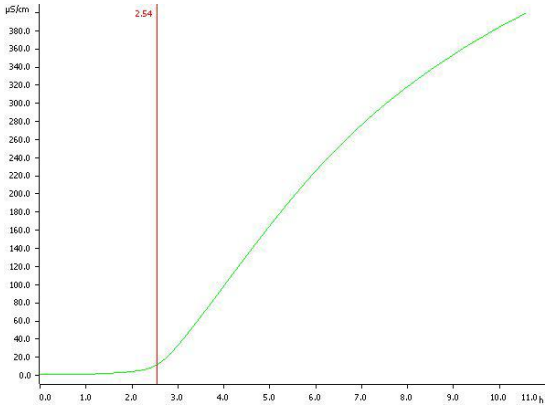

Figure 2. Determination of the oxidation stability of sample 4. Induction time is determined to be 2.54 h.

Table 1. Overview of the different measuring parameters for the samples. Sample 1 is prepared with 60 mL measuring solution, and samples 2–6 are made with 50 mL measuring solution.

Sample	According to	Sample size (g)	Gas flow (L/h)
1	Metrohm	3.00 ± 0.01	20.0
2	EN ISO 6886	3.00 ± 0.01	10.0
3	AOCS Cd 12b-92	2.50 ± 0.01	9.0
4	AOCS Cd 12b-92	5.00 ± 0.01	9.0
5	AOCS Cd 12b-92	2.50 ± 0.01	20.0
6	AOCS Cd 12b-92	5.00 ± 0.01	20.0

Table 2. Results of the oxidation stability of sunflower oil with the 892 Professional Rancimat. Determinations were carried out in four-fold for each parameter set mentioned in the norms.

Sample (n = 4)	Mean value (h)	SD(abs) in h	SD(rel) in %
Sample 1	2.57	0.05	1.8
Sample 2	2.51	0.06	2.4
Sample 3	2.53	0.08	3.4
Sample 4	2.51	0.04	1.5
Sample 5	2.75	0.06	2.1
Sample 6	2.56	0.04	1.5

CONCLUSION

A mean value of 2.57 h induction time is found over all samples (n = 24), with SD(abs) = 0.06 h and SD(rel) = 2.1%. These values meet both the repeatability and the reproducibility requirements listed in AOCS Cd 12b-92 and EN ISO 6886.

Furthermore, all demonstrated methods delivered acceptable values for all samples with SD(rel) ≤10% (Table 2).

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CONTACT

Metrohm France
13, avenue du Québec - CS 90038
91978 VILLEBON COURTABOEUF CEDEX
info@metrohm.fr

CONFIGURATION

892 Professional Rancimat

Le 892 Professional Rancimat est un système d'analyse moderne permettant une détermination simple et fiable de la stabilité à l'oxydation des graisses et huiles naturelles par application de la méthode Rancimat, bien établie depuis de nombreuses années. Doté de 8 positions de mesure réparties dans 2 blocs de chauffage. L'afficheur intégré indique l'état de l'appareil et de chacune des positions de mesure. Les touches de démarrage pour chaque position de mesure permettent le démarrage de la mesure sur l'appareil. Des récipients à réaction à usage unique et des accessoires lavables en machine réduisent les couts et le travail de nettoyage à un minimum. Ceci fait économiser du temps et de l'argent tout en améliorant l'exactitude et la reproductibilité de manière considérable.
Tous les accessoires nécessaires aux déterminations sont fournis. Le logiciel StabNet est requis pour le controle de l'appareil, l'enregistrement des données et leur évaluation, ainsi que pour leur sauvegarde.

Équipement pour la détermination de la correction de température pour les Rancimat et les thermostats PVC.

Set permettant un ajustement exact de la température

Couvercle de la cellule de mesure pour instruments de mesure de la stabilité

Avec cellule de mesure de conductivité intégrée.