QCL FOOD SCIENCE

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CDR FoodLab

Checking Oxidation in Fats & Oils by p-Anisidine Value

p-Anisidine Value analysis provides a rapid and reliable way to verify the goodness and the real oxidation stage of fats and oils being sold, purchased or processed. The p-Anisidine Value analysis (AV) deals with fats and oils and with the oxidation processes occurring in them, the undesirable series of chemical reactions involving oxygen that degrades their quality. Oxidation generates a sequence of breakdown products, starting with primary oxidation products (peroxides, dienes, free fatty acids) then secondary products (carbonyls, aldehydes, trienes) and then tertiary products.

Palm Oil

Food industries generally need to control the quality of the palm oil they use in food processing to avoid the presence of a bad smell or a rancid flavour in the final product. It also allows checking and control of the freshness and the quality standards of the oil, especially in relation to its shelf-life.

Other Vegetable Oils (Rapeseed, Soybean, Sunflower)

Many industries use vegetable oils for food processing. They can be submitted to different processes like refining or frying that alter the original condition of the oil. In this case the p-Anisidine Value analysis allows control of the state of the oil and changes over time referred to as oxidation reactions.

Fish Oil

Fish oil is used in the manufacturing of many products such as food, cosmetics and nutraceuticals. In this cases checking the quality of the oil bought or directly used in the processing can be very significant.

All of these matrices oxidize very fast in comparison to other kinds of fats and oils. They contain a large number of polyunsaturated fatty acids, having reactive double bonds between their carbon atoms that facilitate the chemical reactions involving oxygen. Data on this microscopic condition (given by the p-Anisidine Value parameter) can show the oxidation condition of the matrix. This is particularly important in the case of oils and fats that are rancid but presenting reduced Peroxide Value.

The lower the p-Anisidine Value, the better the quality of fats and oils analyzed. Depending on the market the values required vary. For fish oils the p-Anisidine value must be lower than 30, in other sectors less than 10 AV is required.

Analysis Methods

The chemical analysis method for p-Anisidine Value determines the amount of aldehydes (principally 2-alkenals and 2,4-dienals) in animal and vegetable oils and fats by reaction of these compounds with the p-Anisidine. This reaction highlights the concentration of the quantity of aldehydes and ketones, giving the dimension of the secondary oxidation of the fat matrices.

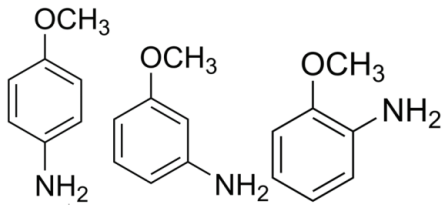
The official method (AOCS Official Method Cd 18-90) uses spectrophotometric analysis and takes 10 minutes to measure the absorbance at 350 nm. It requires the use of two different reagents, handling of toxic and possibly carcinogenic chemicals (Isooctane, Acetic Acid, p-Anisidine), laboratory facilities and specialized personnel.

The FoodLab analysis method is also a photometric method. It enables the reading at 366 nm (p-Anisidine's molecular wave length and absorbance of light) and uses the p-Anisidine as a reagent. It follows the procedure of the official method but has the following advantages:

- Only 2 minutes testing time
- No handling of carcinogenic or dangerous substances
- No requirement for chemical laboratories or specialized operators
- A simple and rapid analysis procedure
- Reliable results expressed as AnV as the AOCS reference method convention

Anisidine and p-Anisidine

In the analysis p-Anisidine (4-methoxyaniline) is used as a reagent to indicate the secondary stage of the oxidation, it is one of the three possible isomers of the Anisidine or methoxyaniline. The other two isomers are o-Anisidine (2-methoxyaniline) and m-Anisidine (3-methoxyaniline).



p-Anisidine Value actually measures the secondary oxidation products like aldehydes, carbonyls, trienes, ketones. Together with a test like Peroxides Value it can provide detailled information about the condition of animal or vegetable oils and fats.

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