

PROBLEM: REVERTED OIL FLAVOR

问题：油的回味

After deodorization, certain oils develop objectionable flavors that may not be recognized as oxidative in nature. This flavor, representative of the original crude oil, has been described as reversion.

一些油经过脱臭后形成令人讨厌的气味，这种气味并非是公认的自然状态下的氧化气味。这种气味有代表性的是原始的毛油味，描述为回味。

Possible Causes and Corrective Action

可能引起的原因和改进的方法

- (1) Air exposure—Oils containing linoleic and lenolenic fatty acids are subject to flavor changes with minimal exposure to air or oxygen of less than 1.0%.

空气接触—含亚油酸和亚油酸脂肪酸的油易引起风味改变，应控制与空气或氧气接触，空气或氧气含量应小于 1.0% 。

- (2) Crude versus refined storage—Most edible oils store best in the crude state. Degummed crude soybean oil oxidizes more rapidly than nondegummed crude oil. Apparently, the phospholipids in crude oil provide an antioxidant function above that of the natural antioxidants or tocopherols.

毛油与精炼油储存的比较—大多数食用油最好在毛油状态储存。脱胶毛油比不脱胶毛油的氧化更快，磷脂在毛油中的抗氧化功能明显地超过了一些天然抗氧化剂或维生素 E。

(3) Temperature control—The rate of oxidation or reversion is dependent upon temperature. Evidently, oxygen will diffuse into and react with the oil faster at higher temperatures. The oxidation rate approximately doubles with each 20F (11.1C) temperature increase; therefore, the 10F above the melting point of the product rule should be enforced to control reversion.

温度控制—氧化或回味速度与温度有关。显然氧气在较高温度下扩散进入油的速度更快。温度提高 20F (11.1C)，氧化速度接近提高一倍；所以在产品熔点以上 10F 时需采取措施控制回味。

(4) Nitrogen blanketing—Nitrogen blanketing of all tanks is an effective means of protecting edible fats and oils. Peroxide development and flavor instability can be virtually eliminated by keeping oxygen away from the oil at all stages of processing. Evaluations of soybean oil stored several months with and without nitrogen protection showed a decided more rapid flavor deterioration for the oil stored with air exposure.

氮气覆盖—氮气覆盖所有的油罐是保护食用油脂的一个有效方法。在所有加工过程中隔绝氧气能实际消除过氧化物的形成和气味的不稳定。大豆油在没有氮气保护储存几个月时比暴露在空气中储存时气味更快速恶化。

(5) Phosphatide removal—Residual phosphatides will contribute to off-flavors and colors. Some of the phospholipids and their associated metal complexes are not easily hydratable with changes as a result of oil abuse.

These complexes require phosphoric acid pretreatment for their removal in degumming or refining. The prebleach process cleans up traces of soap and phosphatides remaining from the refining process. Problems will develop with the deodorized oil if the feedstock has a phosphatide content above 20 ppm.

磷脂的排除—残留的磷脂能引起异味和变色。一些磷脂和与其结合的金属复合物不易从油中水化去除。这些复合物需通过在脱胶或精炼中加磷酸预处理来去除。预脱色过程去除了精炼过程残留的痕量皂和磷脂。如果脱臭时给料油的磷脂含量超过 20ppm 会产生问题。

(6) Bleaching earth filtration—Complete removal of the bleaching media from the bleached oil is very important since residual earths can act as a prooxidant. The bleaching operation should be controlled with filterable impurities evaluations to insure that the bleached oil transferred to storage or the next process is free of any contaminants that could decrease the oxidative stability.

白土过滤—完全去除脱色油中的白土是非常重要的，因为残留的白土会促进氧化。脱色操作可通过检验并控制过滤杂质来保证脱色油到储存或下一工序没有受到污染而降低氧化稳定性。

(7) Vacuum bleaching—The primary function of the bleaching process is to remove peroxides and secondary oxidation products. Secondly, the process cleans up traces of soap and phosphatides remaining after the refining step and the adsorption of color pigments. Vacuum bleaching is

more effective than atmospheric bleaching. It usually requires less bleaching earth, operates at lower temperatures, and minimizes oxidation by reducing exposure to air and providing an opportunity to cool the oil before returning to atmospheric conditions.

真空脱色—脱色过程的主要功能是去除过氧化物和二次氧化产物。其次脱色去除精炼后残留的痕量皂和磷脂及吸收色素。真空脱色比常压下脱色更有效。可以减少白土用量，降低操作温度，减少与空气接触从而减少氧化，在回到常压时油有个冷却过程。

- (8) High peroxide value to deodorization—Contrary to most beliefs, no significant oxidation breakdown products are removed by deodorization; their only opportunity for removal is the bleaching process. The thermal decomposition of peroxide formation in the oil during subsequent storage is increased and the flavor stability of the finished oil is compromised. Rebleaching before deodorization, when the peroxide value has been allowed to increase, is necessary for adequate flavor stability.

高过氧化值去脱臭—和大多数的认为相反，通过脱臭去除氧化分解产物没有意义；它们去除的时机应在脱色过程。油在后来的储藏过程中过氧化物热分解提高，危及成品油的风味稳定性。当过氧化值超过允许范围，在脱臭前重新脱色对一定的氧化稳定性是必需的。

- (9) Deodorizer temperatures—Normally, the deodorization temperatures used range from 400 to 525F (200 to 274C). The deodorization process is time/temperatures dependent; lower temperatures require longer times, and

higher temperatures have a favorable effect upon deodorization efficiency, excessive temperatures are detrimental to flavor stability. Twice as many tocopherols are stripped out of the oil at 525F (275C) as at 465F (240C); therefore ,for flavor stability, the lowest practical deodorization temperature should be utilized.

脱臭温度—通常脱臭温度范围为 400—525F (200—274C)。脱臭过程由时间/温度决定；较低的温度需较长的时间，较高的温度能提高脱臭效率。过高的温度对风味稳定性是有害的。在 525F (275C) 时维生素 E 的去除是在 465F (240C) 时的 2 倍；所以对风味稳定性而言，应采用实际的最低脱臭温度。

- (10) Reduced stripping steam flow—Inability to maintain acceptable oil quality when the deodorizer temperature, vacuum, and feed rate appear normal may be caused by a reduced or restricted stripping steam flow. It may be necessary to redrill the sparger holes if a boil out does not correct the problem.

减少汽提用蒸汽流量—当脱臭温度，真空度和流量正常时不能保持油的质量，可减少或限制汽提用蒸汽流量。如果不能解决问题可能需调整喷淋。

- (11) Avoid air contact—Fats and oils must be protected from air through out deodorization . An oil reacts rapidly with oxygen at deodorizer temperatures with deteriorating effects upon flavors and oxidative stability. Potential air sources are

*air leaks in fittings below the oil level, in pumps, the shell, heaters, and coolers

*nondeaeration of the deodorizer feedstock

*stripping steam must be oxygen-free by generating from deaerated water.

避免空气接触—油脂在脱臭过程中必须和空气完全隔绝。在脱臭温度有氧气存在时油快速反应，风味和氧化稳定性恶化。潜在的空气来源是

*油低于合适的位置，用泵输送，外壳孔洞，加热和冷却过程中空气泄漏

*脱臭给料未脱气

*汽提用水蒸汽必须用脱气后没有氧气的水

(12) Chelating agent—Addition of citric acid (0.005 to 0.01% based on the weight of the oil) or phosphoric acid (0.001% based on the weight of the oil) before and after deodorization helps protect against oxidation and/or reversion. The acid inactivates the trace metals, particularly iron and copper, which may be present in the crude oil or picked up during processing. These acids decompose rapidly at temperatures above 300F (150C). The usual practice is to add the acid during the cooling stage in the deodorizer, during bleaching, and prior to caustic refining. Excessive amounts of phosphoric acid lead to the development of watermelon- or cucumber-type off-flavors, even with good oxidative stability results.

螯合剂—在脱臭前和脱臭后添加柠檬酸（油重量的 0.005 到 0.01%）或磷酸（油重量的 0.001%）以防止氧化和返味。酸螯合痕量金属，特别是铁和铜，这些元素存在于毛油中或在加工过程中产生。这些酸在温度超过 300F（150C）时快速分解。这些酸实际中通常在脱臭冷却过程，脱色过程，中和之前添加。加入过量的磷酸虽然有好的氧化稳定性但形成西瓜或黄瓜类

异味。

- (13) Antioxidant replacement—Fats and oils resist oxidation until the antioxidants are destroyed during the induction period or the interval when oxidation proceeds at a slow rate. After the antioxidant ceases to function as a free radical terminator, there is a rapid increase in the rate of peroxide development. Replacement of the destroyed antioxidants with tocopherols or synthetic compounds will significantly improve the oxidative stability of the oil.

抗氧化剂的恢复--在诱导期或缓慢氧化期间油脂抗氧化直至抗氧化剂消耗尽。在作为自由基清除者的抗氧化剂耗尽后，过氧化物形成速度迅速提高。用维生素E或合成化合物恢复耗尽的抗氧化剂来提高油的氧化稳定性是值得关注的。

- (14) Light exposure—The deleterious effects of light exposure upon the flavor stability of edible oils is well known. Only limited exposure of the oil to sunlight or ultraviolet rays from florescent lightening will increase the peroxide value of the oil and impart off-flavors. Samples from any process should be protected from the light to ensure a representative analysis of the product. Clear glass or plastic containers should not be used to sample oils in process.

曝光量—众所周知食用油暴露在光线中会损害其风味稳定性。少量的阳光或紫外线照射油就会增加其过氧化值产生异味。过程中样品要避光以保证分析到有代表性的样品。透明的玻璃或塑料容器不要用在加工过程的样品油中。

- (15) Blend stocks before deodorization—Shortenings, margarines, and some salad oils

are blends of two or more basestocks or oils to achieve the desired product characteristics. Blending of these stocks prior to deodorization, rather than after, minimizes the handling and storage of the deodorized oil. It also allows process control to determine if the product has been abused inadvertently. This would allow the product to be bleached prior to deodorization for the removal of the secondary oxidation products.

在脱臭前混合原料—起酥油，人造奶油和一些色拉油是由两种或更多种基料或油混合得到希望的产品。在脱臭之前混合原料与之后混合相比，减少了脱臭油的操作量和储存量。还可以通过过程控制确定产品是否因不注意而弄错。这将使产品在脱臭前的脱色中去除二次氧化产物。

(16) Boiler water treatment –Additives to treat can provide puzzling flavor results.

锅炉水处理—处理炉水的添加剂可能产生莫名其妙的气味。