LALLEMAND

BAKING UPDATE

VOLUME 2 / NUMBER 18

Divider and Pan Oils

Practical technology from Lallemand Inc., parent of American Yeast Sales, producers and distributors of Eagle® yeast, fresh and instant.

AMERICAN YEAST SALES Eagle fermipan

Oil Analyses

Oils and fats can be analyzed and characterized by various analytical methods. The following analyses are most useful for quality control on oils used as lubrication or release agents.

Peroxide value is a quantitative measure of the amount of lipid hydroperoxides present in oil. When oils or fats begin to show oxidative degradation, the level of hydroperoxides increases, and off odors and flavors are more likely to develop that may affect shelf life of the bread or baked goods.

Viscosity is a measure of the flow characteristics of a liquid. Viscosity is usually measured in centipoise (cps) or in SSU (Saybolt Seconds Universal). Keeping viscosity in a consistent range that is optimal for its particular application is important for pan oils, divider oils, and trough greases.

Smoke point is the temperature (°F) at which the oil begins to decompose in such a way that smoke or fumes start to appear. A low smoking point is indicative of the type of oil present or can also be an indication of limited stability at high temperature. Normally, high smoke-point mineral oils are used (approximately 290–300°F) to lower the smoke point of the lubricant vegetable oil from 360–475°F to a range of 310–350°F. However, the use of low smoke-point mineral oil for adjusting viscosity can lead to significant smoking problems in bakery production, and therefore most divider oils cannot be used as pan oils.

Relative rate of polymerization is a measure for the rate at which a given oil or oil blend begins to polymerize and becomes highly viscous and finally gummy after it can no longer resist thermal and oxidative decomposition. This test is done at elevated temperatures (221°F) using uniform amounts and surface area coverage of the oil. This is the most important test for predicting performance of pan oils that are exposed to elevated temperatures while covering a metal surface in a thin layer of standard thickness.

Oils Used as Lubricating or Release Agents

OILS AND SHORTENING are widely used in breadmaking as functional ingredients for improving loaf volume, crumb grain, and crumb softness. Oils are also utilized in industrial bread production as lubrication and/or release agents. Specialty oils are applied to prevent dough from sticking to dough troughs, chutes, or hoppers. Divider oils are used to facilitate the dough dividing and scaling operation, while pan oils are sprayed on pans to help in the release of the baked bread from the pans at the depanner.

Trough grease is sprayed on the interior walls of a dough trough to prevent the dough from sticking to the sides when it is discharged from the trough. Dough is generally more sticky immediately after mixing, when it holds less water. The trough grease forms an effective moisture barrier so the dough becomes less adhesive. Excessive amounts of trough grease should be avoided because it causes discoloration of the crust (spotting) where too much oil has been applied.

The viscosity of trough grease should be low enough to spread easily when applied using suitable equipment for spraying the oil under pressure, but not so low that it will start to run down and puddle. Usually, the semiviscous types with a viscosity range between 500 and 4000 cps at 80°F are preferred for this application.

Divider oil is used as a lubricating agent, allowing an efficient and accurate divider operation. During the past decade, important developments have taken place in dividers used for scaling fermented dough into loaf-sized dough pieces of precise and constant weight. Modern dividers now have automatic checkweighing systems for automatic and continuous readjustment of scaling weight. The dividing operation is performed in a special pocket-type divider or in one of the more recent rotary dividers or latest extrusion dividers. All currently available dividers use a volumetric, not a gravimetric, method for scaling. Therefore, dough density of the fermenting dough must be kept constant using dough pumps for degassing and compression chambers prior to the actual dividing of the dough.

An extrusion divider extrudes the dough through an orifice, while a rotating knife cuts it to desired length and weight. The latest extrusion dividers operate with-

Continued

COMPARISON BETWEEN VARIOUS BREAD PAN OIL COMPOSITIONS

BREAD PAN OIL COMPOSITION	STABILITY*	PAN CYCLES**
Soybean oil, lecithin blend	48 hours	300 cycles
Soybean oil, 20% white mineral oil, lecithin blend	72 hours	
Soybean oil, 40% white mineral oil, lecithin blend	96 hours	
Partially hydrogenated soybean oil (iodine value = 110), lecithin blend	120 hours	450 cycles
Partially hydrogenated soybean oil (iodine value = 110), white mineral oil, lecithin blend	176 hours	
Partially hydrogenated soybean oil (iodine value = 110), coconut oil, white mineral oil, lecithin blend	400 hours	> 600 cycles

* Stability measures time (hours) before residue buildup starts from the relative rate of polymerization of the oil.

** Average (relative) number of pan cycles before pans need to be reglazed when using 40 oz. oil per 1,000 pans (1.5 lbs.); actual numbers vary depending on exact conditions.

Oils Used as Lubricating or Release Agents *(Continued)*

out the need for the lubricating and sealing effect of oil.

A pocket divider has a rotating cylinder with pistons that sucks the dough into the pockets, scrapes off the excess dough when the cylinder rotates, and then ejects the dough piece onto a conveyer belt. This type of divider requires a proper lubrication system that pumps the oil to lubricate all metal parts that come into contact with dough, such as dough chambers, hopper knife, plungers, and pockets. The oil of choice depends on the type of equipment, its current state of operation, the product being produced, and economics.

No matter what divider, the function of the divider oil is to provide sufficient lubrication to keep the divider operating efficiently at high output, minimize the wear and tear of the divider components, maintain consistent and accurate scaling weights, and reduce sanitation problems. Most divider oils are quite fluid, with a viscosity between 70 and 200 SSU at 100°F.

Pan oil is used to provide consistent release and uniform bread quality with an ease of application using spraying equipment for applying the pan oil effectively. Bread pans can be either traditional silicon-coated or nonstick Teflon-coated. While nonstick coated pans are more expensive, the coating will last much longer and no oil is needed as a release agent. Traditional silicon-coated pans require pan oil with every bake to protect the silicone coating and need to be recoated (reglazed) after several hundred bakes.

Pan oils are unique combinations of vegetable oils and/or mineral oil, lecithin, antioxidants, antifoaming agents, and other materials. Soybean oil and its related derivatives are still the primary oils used in today's bread pan oils because of their relatively high smoke point of approximately 450°F, their natural winterization (meaning that no fat crystals are formed unless the oil is exposed to temperatures below 40°F), and their viscosity range that makes them very suitable for spray applications. The major drawback of soybean oil is its tendency to polymerize, meaning that it will be susceptible to buildup of residue on bread pans unless supplemented by mineral oils with a high smoke point and antioxidants such as THBQ.

The protection of the silicone coating is also improved by adding emulsifiers such as lecithin or monoglycerides, which also improve the release function of the pan oil. In addition to this type of bread pan oil, several high-stability oils are now available. Although higher in price, these oils can be more cost effective because of a reduced tendency to build up residue in the pan that will interfere with proper release of the bread. The table compares pan oils of low, intermediate, and high stability and how this affects the need to reglaze the pans. The table indicates that if bread pan oils are more stable, polymerization and residue buildup from the small amount of oil left on the pan after depanning will occur much slower. Hence, the oil will stay more liquid and help to protect the silicone glaze from degrading too quickly, so the pan cycle life will be longer. In addition, pan oil usage level will not have to be increased as rapidly to compensate for the buildup as the number of bake cycles increases.

The most important problems encountered with bread pan oils are excessive residue buildup due to overusage or low stability of the oil, oven smoke problems, and poor sanitation. Proper application of the bread pan oil plays a very critical role because, no matter how stable the bread pan oil, optimum results cannot be obtained without proper control. Overusage, while sometimes a quick fix for immediate release problems at the vacuum depanner, will significantly contribute to all of these problems. Therefore, release problems should not be resolved by using more pan oil, but by routinely examining other aspects of the operation such as uneven spraying patterns due to improper nozzle settings or clogged nozzles.

Oven smoke in a bakery is most likely caused by using the wrong type of oil and will become even worse when too much pan oil has been used. Therefore, one should never use divider oil after inadvertently running out of pan oil, because this most certainly will create a severe smoking problem.

Specialty Oils Supplied by Lallemand

LALLEMAND is a leading producer of yeast and dough conditioners and supplies a full line of products to the baking industry through its subsidiaries Lallemand Distribution and American Yeast Sales. Lallemand is distributor of all Mallet products, including a line of specialty oils used as lubrication or release agents.

MALLET

Specialists in oils, ingredients and custom food-processing equipment

Trough Grease L and ***Tro-Lube*** are spray-type oils formulated for lubricating chutes and troughs.

Band Oven Oil is a special blend that includes winterized vegetable oil for lubricating oven bands for releasing cakes, cookies, and pizza.

Depan 30, Depan 60, Vegalube 20 and ***Vegalube 40*** are blends of soybean oil and high smoke-point mineral oil used as pan oil.

Vegalube Super P, Vegalube Excel, and ***Vegalube 1100 Special P*** are easy-to-apply pan oils of high stability that resist polymerization and cause less residue buildup.

Thriftee, Thriftee EZ Release, and ***Thriftee Gold*** are depanning compounds specially formulated for cake applications.

Exa-Lube, Ultra-Lube, Prima-Lube, and ***K-Lube*** are divider oils with different viscosity ranges for optimal performance in the various dividers that are used in industrial bakeries.

All Mallet products are kosher-certified and are backed by Mallet with technical support and expert advice on what oils to use and how to apply them.

LALLEMAND
BAKING UPDATE

Lallemand Baking Update is produced by Lallemand Inc. to provide bakers with a source of practical technology for solving problems. If you would like to be on our mailing list to receive future copies, or if you have questions or comments, please contact us at:

LALLEMAND Inc.
1620 Préfontaine
Montréal, QC H1W 2N8 CANADA
tel: (800) 840-4047 (514) 522-2133
fax: (514) 255-6861