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## Use of Indicators for Showing the End Point of The Swift Fat Stability Test on Lards

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THE Swift Fat Stability Test has been in common use for measuring the keeping quality of lards. (1) The end of the induction period is determined by organoleptic means, and then confirmed by titration of the peroxides formed. The objection to this procedure is that it is difficult to determine the end of the induction period by smelling if the lard is not neutral to begin with. There is the personal factor involved, i.e., no two operators will sense the end of the induction period at exactly the same time. Also, there is a tendency to omit the confirmatory test of titrating the peroxides and to rely solely upon smelling for determining the end of the induction period. The author proposes to replace organoleptic tests and peroxide-titration by causing a color change of suitable indicators at the end of the induction period, similar to the scheme of Stebnitz & Sommer in determining the keeping quality of butter (2).

Theory: This method is based on the production of volatile fatty acids in the lard at the end of the induction period, due to hydrolysis of the peroxides formed during the oxidation of the lard. Powick has shown that the fatty acids formed from the splitting of high molecular weight acids were the lower molecular weight acids and that most of the saturated acids up to C9 have been identified (3). Powick has shown that at the end of the induction period there is a rapid increase of volatile fatty acids distilled over by bubbling air through fat at 100°C. (4). The author has found that the quantity of fatty acids distilled over by bubbling air through 20 gms. of rancid lard overnight is equivalent to 4.0 cc. of 0.1 N NaOH.

Method: Air is allowed to bubble through lard (at 100°C.) and then through 10 cc. of indicator solution, respectively. When the indicator, contained in a test tube, changes color, the end of the induction period has been reached. Stebnitz and Sommer employed methyl red for use with butter (2). The author found methyl red unsatisfactory for use with lard; the color change usually occurred one to two hours after the end of the induction period had been passed. Alizarin red S and Brom Cresol Green gave consistent results which checked with results obtained by the original Swift's Methods. (See Table I.)

Directions for preparing indicators:

1. Brom Cresol Green: Triturate 0.1 gm. of the indicator with 14.3 cc. 0.01 N NaOH, and dilute

to 250 cc. with water. Further dilute 1 cc. to 10 cc. before using.

2. Alizarin Red S. (Alizarin Mono-sodium Sulphonate). Make a 0.1% solution in water.

TABLE I.

Lard Sample	Indicator Used	Peroxide Value When Indicator Changed Color	Stability
A	Alizarin Red S	30 milliequivalent of oxygen	3 hours
B	" " "	26 " " "	14 hours
"	" " "	19 " " "	12 hours
C	" " "	40 " " "	14 hours
"	" " "	46 " " "	13 hours
"	" " "	61 " " "	13 hours
"	" " "	65 " " "	10 hours
D	" " "	40 " " "	10 hours
"	" " "	25 " " "	12 hours
"	" " "	20 " " "	12 hours
E	" " "	52 " " "	13 hours
"	" " "	63 " " "	14 hours
"	" " "	21 " " "	14 hours
"	" " "	30 " " "	14 hours
F	Alizarin Red S	21 " " "	12 hours
"	Brom Cresol Green	21 " " "	12 hours
G	Alizarin Red S	25 " " "	14 hours
"	Brom Cresol Green	27 " " "	15 hours
H	" " "	14 " " "	5 hours
I	" " "	54 " " "	3 hours
J	" " "	46 " " "	3 hours
K	Brom Cresol Green	23 " " "	2 hours
"	" " "	25 " " "	4 hours
"	" " "	40 " " "	3 hours
"	" " "	17 " " "	3 hours
"	" " "	29 " " "	2 hours
"	" " "	23 " " "	2 hours
L	Alizarin Red S	29 " " "	6 hours
"	" " "	20 " " "	5 hours
"	Brom Cresol Green	21 " " "	6 hours
"	" " "	32 " " "	4 hours
M	No indicator	40 " " "	6 hours
"	" " "	29 " " "	6 hours
"	Alizarin Red S	40 " " "	5 hours
"	" " "	36 " " "	6 hours
"	Brom Cresol Green	21 " " "	6 hours
"	" " "	25 " " "	5 hours

Summary: In determining the keeping quality of lards by use of the Swift's Fat Stability Test, pH indicators may be used to replace the organoleptic means and peroxide-titration for ascertaining the end of the induction period. This does away with the personal factor and is more convenient for the operator. Instead of smelling the several tubes and then titrating the peroxides produced in the lards, the operator needs merely to glance at the test tubes containing the pH indicator in order to determine whether or not the end of the induction period has been reached.

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