rancidity eventually developed, but long before that, the tallowy odor and taste had made the crackers inedible. As we watched the test, the first indication that something was wrong was the lack of any good cracker odor at all, then came an off-taste even before the odor could be detected, then an off-odor or tallowiness strengthening until true rancidity developed. We did a little work on cookies also, although the bulk of our work was carried out on crackers. The amazing thing to us about our work on cookies was that the sugar in the cookies apparently gave no protection against tallowiness as it does against rancidity.

As before mentioned, our test was only a practical one, but from it we felt able to draw two conclusions that we thought would assist the cooky and cracker manufacturer in his packaging problems. The first conclusion is that if he is going to display his products in unprotected glass showcases, or in cellophane bags, he would do well to choose types of shortening most resistant to light. We tested all-hydrogenated cottonseed oils, hydrogenated soybean oil compounds, oleo oils (both No. 1 and No. 2), lard, and a mixture of lard and oleo oil. A good all-hydrogenated cottonseed oil we have found to be the most resistant to rancidity. This also held true for light. The hydrogenated soybean oil compounds, which are fairly resistant to heat, we found very susceptible to light. They were probably the worst of all types examined in both odor and flavor. Good oleo oils, which we ordinarily find will resist heat for as long as 16 to 25 days, were very poor in resistance to light, running as low as 1 to 5 days. Here, too, the odor is strong and disagreeable. Lard, much to our surprise, failed to develop tallowiness at all in light, although it is quite poor in resistance to rancidity coming from heat and age. The first off-odor from lard in light was that of true rancidity. Then in an effort to improve the resistance of oleo oil to light, we tried a 50-50 mixture of oleo and lard, and our results were about the average keeping time of the two, perhaps slightly less.

Now as to the protection afforded by different colored cellophane bags; as might be expected, the clearer bags permitted tallowy odors to develop considerably earlier than did the amber shades. Where the type of shortening used was very susceptible to light, however, darker colors seemed to help but slightly.

The effect of light was found to be most rapid. For example, late one afternoon we received two boxes of crackers from a biscuit plant. Both were made with the same oleo oil, packed from the same run. One was packed in the usual type of cardboard box, the other in a new cardboard box that the baker had just purchased. The crackers in the new type box were decidedly tallowy, and the manufacturer was interested in knowing whether this was caused by inferior cardboard, whether the box was causing the off-odor in the crackers. To make a test on the cardboard, the lid was torn from each box and the cardboard put in the cabinet at 145° F. Of course that allowed each box of crackers to stand unprotected where they had been placed, on the west end of a laboratory table, exposed to the afternoon sunlight. The next morning on coming into the laboratory the new type box was picked up and the crackers smelled to see if the off-odor had dissipated, as this sometimes occurs. No, it was just as bad as ever. Then the old type box of crackers was smelled, the one that had been all right upon arrival 17 or 18 hours earlier. And these were just as bad as the first box, where they had been perfectly sweet and fresh the night before. Exposure to what daylight those crackers would receive from 3 or 4 o'clock in the afternoon until 8:30 the next morning had given them a disagreeable, strong off-odor. It should be added that the ink of the cardboard in the new box was found to be rancid, and this flavor had carried through into the crackers, thus causing the complaint of the biscuit manufacturer when the crackers were sent to us.

So, from our work on the effect of light, which has only been started, we have so far drawn only the two conclusions—first, to pick carefully the type of shortening to be used in baked products that will be exposed to light, and second, if a cellophane bag is to be used, the amber shades give greater protection than the colorless.

The biscuit and cracker baker uses fats for other purposes than as shortenings; fats for coatings and for sandwich work. These are usually cocoanut oils, such as the spray for the type of cracker which you may recognize as the "Ritz" cracker. For sandwich fillings a plastic cocoanut butter is used, and for imitation chocolate coated cookies, or for white or colored hard butter coatings, a hard cocoanut butter is employed. Some difficulty is experienced with these fats becoming soapy, but if so, the introduction of moisture is usually the cause, and it is brought into the coating by some other ingredient.

Some bakers may base their choice on mixing and creaming properties, on shortening value, on plasticity, or on texture of the fat, but we believe the characteristic of most interest to the manufacturer of biscuits and crackers is that of keeping property.

Correction for "Some Notes on the Determination of Glycerol in Fats" Published in the January Issue of "Oil and Soap"

Page 14, Column 1, Line 12—

The fat containing the stearic acid is heated to 110-120° C. for tallow and coconut oil and to 140-150° C. for hydrogenated cottonseed oil and cottonseed oil by immersing in an oil bath at 160-150° C. for one and three minutes, respectively.

Addition—

Acknowledgment—

It is a pleasure to acknowledge the valuable contributions and suggestions made to this paper by Mr. E. A. Currier of the Hammond organization.