The Selection of Mayonnaise Equipment

Effect of Metals on the Keeping Qualities and Nutritional Value of Mayonnaise and Salad Dressing

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NO problem which the manufacturer of mayonnaise and salad dressings has to face is more serious than the problem of preventing or delaying the development of rancidity in his products. The question of rancidity is of such great importance that it affects the nature of the distribution. All manufacturers strive to have a product which will possess maximum keeping qualities, and which will reach the housewife in a satisfactory condition after traveling through various avenues of distribution, from the factory to jobber, from jobber to retailer.

In the course of time mayonnaise and salad dressings become rancid and unsalable. The oils in the mayonnaise and salad dressing have a tendency to absorb oxygen, but they do not absorb oxygen as soon as they come in contact with the atmosphere but pass through a period during which there is practically very little oxidation. This period is the so-called induction period. As time progresses the oils become more susceptible to oxidation and the spoilage of the product increases very rapidly. The problem consists in eliminating all possible factors which will reduce the induction period and hasten rancidity, thus prolonging the keeping qualities of the finished product.

Among the factors which contribute to the spoilage of mayonnaise products and tend to make them rancid, is the presence of certain *"metals"*. From studies made on the effect of metals on butter-fat and other oils, it is known that certain metals act as catalysts or accelerators, decreasing the induction period of the oil and making it more susceptible to oxidation. Therefore, if the fatty compound contains appreciable quantities of said metals, the keeping qualities of such product will decrease and when placed on the market it will turn rancid in a relatively shorter period of time. Among the metals which have an effect upon increasing the susceptibility to rancidity are iron and copper. It has been shown by Hunziker & Hussman (1) and by Rogers, Berg, Potteiger & Davis (2) that small amounts of iron or copper incorporated in butter produces quick spoilage. Supplee (3) has also shown that copper salts added to milk in quantities between ten to fifteen parts per million will accelerate the production of "tallowiness" in a milk product even when it is in a dry state. The presence of a small amount of iron in an oily food product also has the effect, although in a much smaller degree than copper, of increasing the process of rancidity (4). In the course of manufacture, fatty food products become contaminated with small amounts of metals from the utensils and equipment used, and as a result turn rancid in a relatively shorter period of time. Mayonnaise and salad dressings contain a considerable amount of acid varying from ½ to 1½%. When in contact, during the manufacture and packing, with utensils and machinery they may become contaminated with metals which will shorten the keeping qualities of the finished products and accelerate their spoilage (8).

M. C. Reynolds (5) has pointed out that the acid of mayonnaise will dissolve out the iron from a poorly tin-lined tank and that very small traces of iron are detrimental to the keeping qualities of mayonnaise products, and recommends enamel ware whenever possible or a non-corrodible metal. He also calls attention to the fact that faulty liners in caps sometimes contribute to rancidity. These liners become soaked with the mayonnaise, the caps becoming rusty on the inside, and the rust coming in contact with the mayonnaise accelerates its spoilage. He recommends an oiled paper liner with a paraffine coating and cardboard backing as the most satisfactory liner developed so far. From a commercial standpoint the ideal metals have not yet been discovered which will be absolutely inert to salad dressing products. However, it is known that copper and iron are detrimental and efforts should be made

by the manufacturer to eliminate these metals as much as possible from his finished product.

From practical experience the following may be suggested to help the manufacturer in keeping objectionable metals out of his products. Tin lined copper measures from which tin has been worn off should not be used to measure out vinegar. Neither should enamel measures be used from which the enamel has been chipped off as the exposed iron will tend to dissolve in the vinegar. The bowls in which the product is emulsified should be retinned frequently. If a homogenizer is used in connection with the manufacturing of salad dressing or mayonnaise it should be washed each and every day and certain portions of it should be replated, as frequently as necessary. Measuring cans used for measuring oil which are attached to some of the bowls should be kept clean and retinned, and preferably made from a non-corrodible metal. Holding tanks and sanitary gate valves should be glass lined. Brass faucets should not be used as there is a considerable amount of splashing during manufacture and the acid product dissolves some of the copper forming green layers of copper acetate, thus contaminating the finished product. The filling machine should be cleansed and dried after each day's production.

Recently manufacturers have been preparing salad dressings which are cooked and contain a relatively large proportion of vinegar. It is essential in order to keep the product in good condition not to use copper utensils for the preparing, mixing or stirring of such product. It is essential that the hot vinegar should not come in contact with any iron or copper utensils or with enamel ware which has been chipped off. Glass lined tanks are most suitable for this purpose. Wherever possible properly tinned equipment or glass lined equipment should be used.

From carefully controlled large scale experiments performed we have found that it is possible to eliminate metals from the mayonnaise and salad dressing if special precautions and proper care are taken and that such products will keep in a better condition for a much longer period of time than mayonnaise and salad dressings which are contaminated with appreciable quantities of iron and copper. Aluminum utensils are suitable when the products are cold. Aluminum and tin have practically no effect with regard to increasing rancidity in mayonnaise products. A rancid mayonnaise and salad dressing is not palatable nor appetizing and has less nutritional value. Hess and Unger ([6]) and others ([7]) have shown that an oxidation process resulting in the rancidity of food products containing oil or fats has a tendency to destroy vitamins A, E and C. In other words the presence of metals in mayonnaise products tends not only to make the product rancid but also to reduce the biologic food accessories derived from the yolk material and other ingredients present in the product.

A number of recently developed salad dressings which are made by the cooking process and which contain an especially large amount of acid have been found to be rancid and upon analysis it was discovered that these products contain an excessive amount of metals. While we have not the ideal equipment which is especially suited for the mayonnaise industry, however if sufficient precaution is taken a considerable amount of the trouble may be avoided.

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[2] Robers, L. A., Berg, W. N., Potteiger, C. R. and Davis, B. J., Bull. 162. Bur. An. Ind., U. S. Dept. Agr. (1913).

[3] Supplee, G. C., Proc. World's Dairy Congress, 1923, 1248.

[4] W. L. Davies Deterioration of Fats Chemical Age 20. 482-92. May 25, 1925.

[5] M. C. Reynolds "Factory Planning and Sanitation of Mayonnaise Factories,"Spice Mill Feb. 1927.

[6] A. F. Hess and L. J. Unger: The Destruction of Anti-scorbutic Vitamines in Milk by the Catalytic Action of Minute Amounts of Copper. Soc. Exp. Biol. & Med. Vol. 19—page 119 (1921).

[7] L. S. Frederica; Inactivating Action of Some Fats, Vitamin A in other fats—Biological Chem. 62, pages 103-104 (1925).
H. A. Mattill: The Oxidative Destruction of Vitamin A and E. Journal Amer. Med. Ass., page 1505 (1927).
Neils Sjossler: On the Sulphuric Acid Reaction of Butter Fat and The Disappearance of the Reaction from Butter Fat through the Action of Oxidized Fat. Jour. Biol. Chem. 62 (1925), pages 487-493.
C. C. Supplee and Odessa D. Dow: Reproductive Potency of Dry Milk as Affected by Oxidation. Jour. Biol. Chem. 63 (1925), pages 103-114.

[8] Albert K. Epstein: The Story of Mayonnaise. Home Economic Journal, March 1929.

The Buckeye Cotton Oil Company, a subsidiary of the Procter & Gamble Company, Cincinnati, has acquired the plants of the Dixie Cotton Oil Company, Memphis, and the Louisville Cotton Oil Company, Louisville. The transaction involved approximately $1,000,000.

The annual golf tournament of the Oil Trades Association of New York was held at the Westchester Hills Golf Club, White Plains, September 24. The weather was fine, and the attendance large. About eighty members and guests were present, and the affair was voted one of the most successful outings in the history of the association.