SHORT COMMUNICATION

Method of Obtaining Native Powdered Sunflower Lecithin

ABSTRACT

Thermal dehydration treatment of sunflower sludge leads to a significant deterioration of the quality of the product obtained. A combined scheme is suggested for simultaneous dehydration and fat-removal from sunflower sludge at room temperature.

In the oil industry the term lecithin usually denotes the product obtained by dehydration of sludges which are left out when refining oils.

Lecithin is extremely valuable from the physiological standpoint and is widely used in the pharmaceutical and food industries. However, the utilization of this product for these purposes is hampered by its strong tendency to rapid deterioration brought about mainly by autoxidation processes (1). In a previous paper (2) it was shown that lecithin can be stabilized by some inocuous antioxidants. The effectiveness of the stabilization of powdered lecithin is determined by the method of dehydration and fat removal of the sludge. The better the native properties of lecithin are preserved, the more easily it will be stabilized. The present paper deals with the influence of thermal treatment of the stability of the powdered lecithin obtained. A combined scheme is suggested for obtaining powdered lecithin.

As starting materials we used: (a) crude lecithin (No. 1) obtained by dehydration of sunflower sludge for 20 hr at 60 C in an industrial vacuum evaporator and containing 5.2% water, 38.6% oil and 56.2% phosphatides; (b) crude lecithin (No. 2) obtained by dehydration of sunflower sludge for 10 min at 60 C in an industrial continuous vacuum equipment and containing 4.3% water, 38.0% oil and 57.7% phosphatides; and (c) sunflower sludge containing 72.0% water, 9.5% oil and 18.5% phosphatides.

The stability of powdered lecithin was determined by the rapid method suggested previously (3) according to which the acceleration of the autoxidation process is achieved by initiating the reaction with an energy-rich light. The following procedure was used. Powdered lecithin (about 4 g) was spread in a layer 3-4 mm thick in a glass vessel and irradiated with ultravioled light (500 W mercury lamp). Samples were taken at 1 hr intervals and the peroxide value determined by the Wheeler method. The time required for reaching the peroxide value of 1.5 was used as the measure of stability. For comparison purposes, a stability coefficient (K_{st}) was used which represents the ratio between the stability of a given lecithin sample and that of the lecithin obtained from the sludge in the preliminary runs.

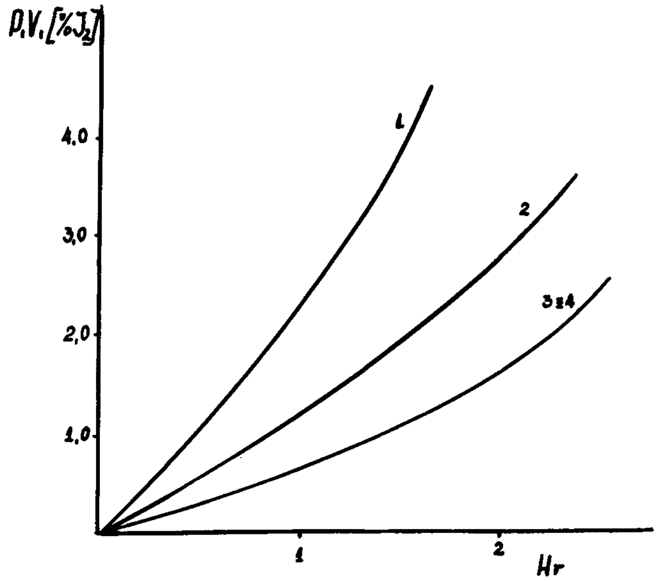

FIG. 1. Kinetic curves of peroxide accumulation in powdered oil-free lecithin obtained from: 1, crude lecithin No. 1; 2, crude lecithin No. 2; 3, sludge (preliminary runs); 4, sludge (by the combined scheme).

Preparation of powdered lecithin by fat removal from crude lecithin was accomplished as follows. Crude lecithin (1000 g) was extracted with 2000 g of acetone six times in a 5 liter beaker with a stirrer insuring good contact between the two phases. The dehydrated and oil-free product was vacuum dried for complete removal of solvent.

Powdered lecithin was also prepared by simultaneous dehydration and fat removal from the sunflower sludge at room temperature. Sludge (2000 g) was extracted with 2000 g of acetone six times in a 5 liter beaker with a stirrer. The product obtained was treated as already described. The volume of acetone required was reduced by using the final three acetone phases of one batch for the first three extractions of the next batch (combined scheme). The first three concentrated acetone phases were used for re-

TABLE I

Properties of Powdered Lecithin Samples

No.	Powdered lecithin obtained from	Peroxide, % I_2	Stability, hr	K_{st}	Color number $mgI_2/100$ ml
1	Crude lecithin No. 1	1.75	0.70	0.42	14.2
2	Crude lecithin No. 2	0.78	1.15	0.70	8.5
3	Sludge (preliminary runs)	0.10	1.65	1.00	3.2
4	Sludge (combined scheme)	0.10	1.65	1.00	3.4

generating and separating the oil.

The characteristics of the dehydrated and oil-free lecithin samples are given in Table I. To obtain a fully oil-free and dehydrated product (samples 3 and 4) the acetone treatment should be performed at least six times. The combined scheme makes it possible to obtain powdered lecithin with far better properties than those of lecithin prepared by fat removal from crude lecithin (samples 1 and 2). The kinetic curves of peroxide accumulation are given in Figure 1, while the stabilities, stability coefficients and peroxide values are shown in Table I. These figures stress the higher stability of lecithin obtained by simultaneous dehydration and fat removal with acetone.

From the results obtained, it can be concluded that thermal treatment of the sunflower phosphatide sludge brings about a significant deterioration of lecithin (darker color and lower stability). We suggest the use of sludge and not of crude lecithin prepared by high temperature dehydration for obtaining high quality native lecithin. The combined scheme for simultaneous dehydration and fat removal is particularly appropriate inasmuch as it reduces the amount of acetone required and yields a highly stable product.

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[Received March 6, 1969]