Adsorption Chromatography of Sucrose Palmitates

SUCROSE mono- and diesters of long chain fatty acids, now commercially available, were first synthesized by Osipow et al. (1) in 1956. According to their reports, so called "sucrose monoester" is a mixture which consists of not only sucrose monoester itself but also sucrose, diesters, and others. It was, however, very difficult to separate these components and determine them quantitatively. Therefore, the properties of pure sucrose monoester or diester have not been investigated.

For the purposes of controlling the quality of the products and of isolating the pure sucrose monoester only, thin layer and adsorption column chromatographies of sucrose esters were employed by the authors. Thin layer chromatography[1] was performed with uniform layer of ca. 1 mm thick of silica gel powder (Mallinckrodt, A. R., 100 mesh powder without binding material) on the glass plate (15 × 20 cm) placed obliquely in a Petri dish of 30 cm in diameter. The eluents were 25% (v/v) ethanol in benzene or 25% (v/v) isopropyl alcohol in benzene. Usually a developing time of 60–70 min is sufficient to provide separation of the components. The spots for sucrose and sucrose esters showed green color by heating for 1–2 min at 100C after being sprayed with 0.2% (w/v) anthrone solution of 70% (v/v) H_2SO_4 (Fig. 1). From these results it is supposed that the sucrose mono- and dipalmitates obtained by Osipow's method are composed of several components, respectively, which may correspond to sucrose, sucrose monopalmitate, dipalmitate, and others.

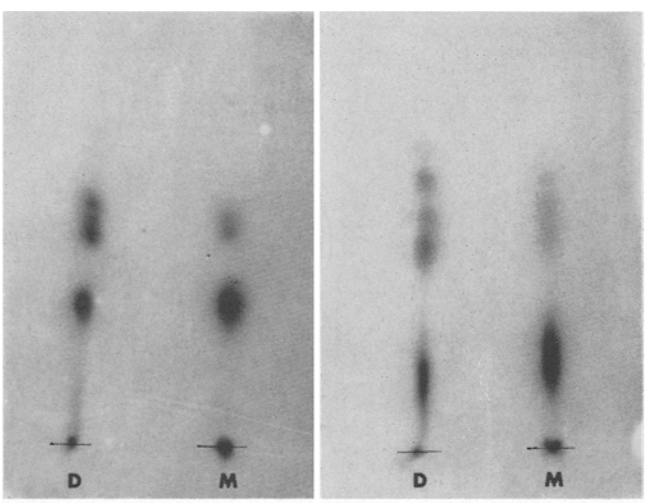

FIG. 1. Thin layer chromatograms of "sucrose monopalmitate" (M) and "sucrose dipalmitate" (D) developed with a solvent system.

Based on these data, adsorption column chromatography with silica gel was examined by eluting with 25% (v/v) ethanol in benzene. From the elution curve obtained by colorimetric method using anthrone reagent, the monopalmitate content in the samples of so called "mono- and dipalmitates" can be determined quantitatively (Fig. 2). And it is found that the above fractionation method is very useful for separating pure monopalmitate.

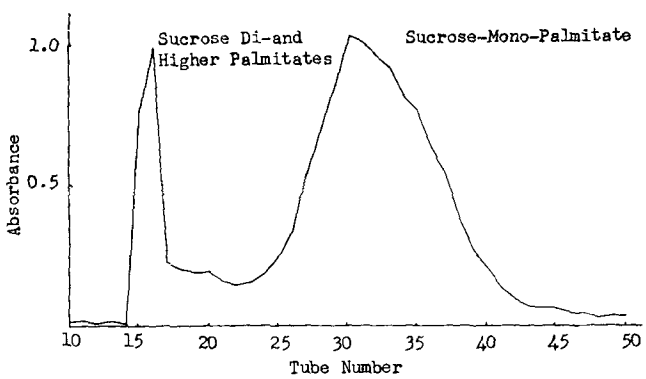

FIG. 2. Elution curve of "sucrose monopalmitate" obtained by colorimetric method using anthrone reagent. The components of sample are sucrose 15%, monopalmitate 65%, and di- and higher palmitate 20%, calculated from calibration curve of sucrose.

REFERENCE

1. Osipow, L., F. D. Snell, W. C. York, and A. Finchler, Ind. Eng. Chem. *48*, 1459 (1956).

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[1] Nov. 29, 1961, Miss M. Gee (Western Regional Research Lab., U.S.A.) visited the authors, and they found that she had also independently succeeded in the separation of sucrose esters with thin layer chromatography by using other solvent systems (toluene, ethanol, and ethylacetate).