

Director's Digest



WERNER R. BOEHME
Technical Director

2720 DES PLAINES AVENUE
DES PLAINES, ILLINOIS 60018
AREA CODE 312-827-0139

March, 1975

No. 123

New Dibasic Acids made from Saturated Fatty Acids

A novel oxidation reaction of saturated fatty acids promises to open the way to a series of dibasic acids which may have broad industrial applications. Obtained largely from petrochemical raw materials in the past, the new products are made from "renewable resources" such as palmitic and stearic acids obtained from animal and vegetable fats.

According to Prof. Norman Deno of Pennsylvania State University, who has been working with grant support from the Fats and Proteins Research Foundation, long chain fatty acids can be oxidized at low cost and in high yields to a mixture of dibasic acids with nitric acid. When palmitic or stearic acid is treated with concentrated nitric acid at 90° C. for 20 hours almost complete conversion to the dibasic acids takes place. The weight of the oxidation products is about 110% of the starting material. About 94% of the product from palmitic acids consists of alpha, omega straight chain dibasic acid containing from six to eleven carbon atoms. From stearic acid 88% of the product lies within this isomer range. Table I shows the distribution of dibasic acids obtained by the oxidation of palmitic and stearic acids. A slightly longer average chain length of the dibasic acids can be realized if the reaction is interrupted before all of the saturated fatty acid is consumed.

Dibasic Acids from Saturated Fatty Acids

Dibasic Acid	No. of Carbons	Weight percent from	
		Palmitic Acid	Stearic Acid
Succinic	4	0	2.7
Glutaric	5	3.8	2.9
Adipic	6	10.0	8.3
Pimelic	7	17.9	17.5
Suberic	8	22.2	20.7
Azelaic	9	23.5	21.3
Sebacic	10	15.0	13.4
Undecanedioic	11	5.6	6.6
Dodecanedioic	12	2.0	2.8
Brassicic	13	0	2.6
Thapsic	14	0	1.2
Pentadecanedioic	15	0	0

The industrial applications of the mixed oxidation products have not yet been explored. Some dibasic acids, such as adipic, azelaic and sebacic acid are manufactured in large quantities as intermediates for the production of nylon, urethane and polyester resins, plasticizers, coatings, extreme temperature lubricants and specialty chemicals.