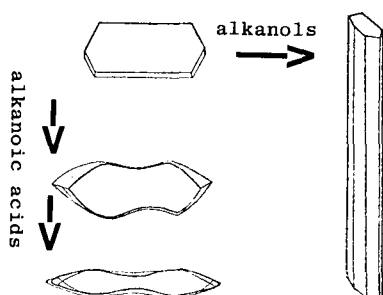


## THE CRYSTAL HABIT MODIFICATION OF A TABLET LUBRICANT, ADIPIC ACID

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Crystal habit can profoundly affect the workability of pharmaceutical powders. Reports on habit modification are usually confined to isolated process improvements with little attention to theory. A notable exception concerned the habit modification of adipic acid by the addition of specific ionic surfactants. (Michaels & Colville 1960).

The present work examines further the habit modifications of adipic acid by the addition of traces of n-alkanoic acids or n-alkanols to the aqueous crystallisation medium seeded at a defined level of supersaturation. Aliquots (up to 2cm<sup>3</sup>) of the n-alkanoic acids and n-alkanols (C<sub>5</sub> to C<sub>12</sub>) in ethanolic solution were added to a solution of adipic acid (18g) in water (400cm<sup>3</sup>) at a temperature (55°C) above saturation. After adding seed crystals (42°C ; 1mg) the doped medium was transferred to the crystallisation vessel at 34.2 ± 0.1°C and stirred at 100 r.p.m. until crystallisation was complete (about 1 h ). The change in habit was dependent upon both the nature and concentration of the additive as shown in the figure. The concentrations of each additive required to produce (a) the first significant effect (threshold concentration) and (b) the maximum effect are noted in Table 1. With increasing concentration of additive above the threshold concentration the change of habit was appreciable for the n-alkanoic acids but small for the n-alkanols. High concentrations of n-alkanols produce birefringent crystals suggesting a high concentration of dislocations, brought about by distribution of additive throughout the crystal.



The kinetics of uptake of <sup>14</sup>C labelled n-alkanoic acids by growing crystals has been examined and related to the present results. The reproducibility of the effects produced indicate considerable scope for controlled habit modification by the addition of low levels of simple additives during crystallisation.

Table 1. Effect of additives on habit of adipic acid crystallised from water

Number of carbon atoms / molecule of additive	5	6	7	8	9	10	11	12
Threshold concentration (µg cm <sup>-3</sup> )	n-alkanoic acids	500	125	60	6	10	6	2 6
	n-alkanols	*	2500	750	190	125	50	25 75
Concentration for maximum effect (µg cm <sup>-3</sup> )	n-alkanoic acids	*	375	250	20	20	20	10 *
	n-alkanols	*	* 1000	310	190	60	90	*

\* not observed at concentrations up to the saturation point of the additive.

Michaels, A.S. & Colville, Jr., A.R. (1960). J. Phys. Chem., 64, 13.