Inasmuch as the official oils of sweet orange and of lemon are obtained by expression of the fresh peel of the fruit, all the original delicacy of flavor and aroma are retained.

Experience shows that 5% solutions of the oils in alcohol of the proper strength duplicate the properties of the official tinctures with the exception of the color.

The proposed alternative tinctures were prepared by the following formula and process:

TINCTURE OF SWEET ORANGE OR OF LEMON.

Oil of Orange or of Lemon	50.0 cc.
Water	190.0 cc.
Tartrazine certified food color	*q. s.*
Purified Talc	*q. s.*
Alcohol	*q. s.*, 1000.0 cc

Dissolve the oil in 750 cc. of alcohol, add the water and sufficient alcohol to make 1000 cc. Add the purified talc, shake well and filter until clear. Add traces of the tartrazine cautiously until the desired color is obtained.

The two tinctures are undistinguishable by the physical senses from the official tinctures in the preparations into which they enter. Moreover, the alternative tinctures possess the advantage of constant composition. The tartrazine food color was found to be unaffected to any appreciable extent by several hours' exposure of the tinctures to bright sunlight and a precedent for the use of an "artificial" color in place of a natural color is found in N. F. VI which directs the use of amaranth for coloring Elixir Triple Bromides, in place of the cudbear of the N. F. V.

By the simple process outlined, considerable economy of money, time and labor is effected and a product is obtained which satisfies every requirement.

SALTS OF TRIETHANOLAMINE.*

BY GEORGE W. FIERO.[1]

Triethanolamine, combined with a fatty acid, is being used to a large extent as an emulsifying agent, particularly in the field of cosmetics. It appears to be superior to other soaps for this purpose because of the ease of emulsification. Triethanolamine soaps have also been suggested as detergents to replace ordinary soaps for certain purposes.

The present study is a comparison of the salts of several fatty acids with triethanolamine. These salts were prepared by the reaction of molecular quantities of the fatty acid with triethanolamine. Pure fatty acids (Eastman) were used in all cases since commercial products are often mixtures.

Surface Tension.—The surface tension was determined by means of a duNouy apparatus at 40° C. on 0.14% aqueous solutions of the various triethanolamine salts. This concentration was chosen since it is considered optimum for detergent action using ordinary soaps. The surface tensions were found as follows:

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[1] University of Buffalo, School of Pharmacy.

Triethanolamine base	66.6
Triethanolamine acetate	69.5
Triethanolamine isocaproate	61.7
Triethanolamine caproate	57.6
Triethanolamine caprylate	46.5
Triethanolamine caprate	34.1
Triethanolamine laurate	27.1
Triethanolamine myristate	33.3
Triethanolamine palmitate	40.4
Triethanolamine stearate	40.4
Triethanolamine oleate	34.6

Determination of numerous commercial soaps of the same concentration indicated a surface tension of 28.5–32.9. Only one (T. laurate) of the triethanolamine salts gave as low a surface tension. The peculiar range of surface tensions is readily seen in the graph (Plate I). Unsaturated fatty acids (oleic) seem to produce salts with lower surface tensions than saturated fatty acids (stearic) of the same number of carbon atoms.

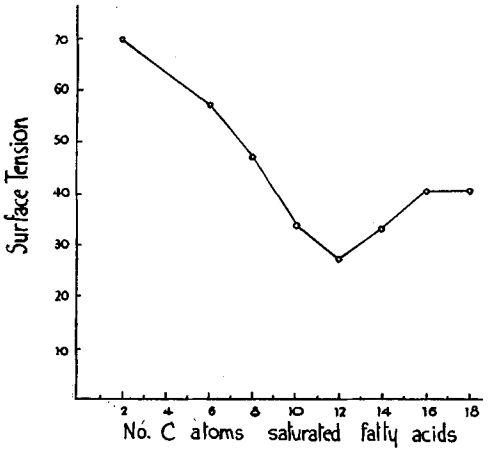

Plate I.—Surface tension of Salts of Triethanolamine.

Suds.—The amount of foam produced when shaken is often taken as an index of quality for soap. In no case did the amount of suds produced equal that of a pure commercial soap. The suds produced were of much less duration than those of commercial soap. The results are indicated in the following table:

Triethanolamine	0%
Triethanolamine isocaproate	5%
Triethanolamine caproate	5%
Triethanolamine caprylate	12%
Triethanolamine caprate	36%
Triethanolamine laurate	48%
Triethanolamine myristate	16%
Triethanolamine palmitate	2%
Triethanolamine stearate	0%
Triethanolamine oleate	40%

The above data were obtained on 0.14% solutions at 22° C.

Alkalinity.—The p_H was determined on 0.14% solutions of the triethanolamine salts using a Taylor colorimetric slide comparator. The results are indicated in the following table:[1]

Triethanolamine	8.9
Triethanolamine isocaproate	6.4
Triethanolamine caproate	6.1

[1] The writer is indebted to E. G. Gundlack for the p_H determinations.

Triethanolamine caprylate	6.2
Triethanolamine caprate	6.3
Triethanolamine laurate	7.1
Triethanolamine myristate	8.0
Triethanolamine palmitate	8.3
Triethanolamine stearate	8.3
Triethanolamine oleate	7.5

The alkalinity of triethanolamine salts was far below that of a variety of commercial soaps which ranged from 8.7 to 9.4 for the same concentration.

Emulsification.—In order to obtain an emulsion which would readily break, a 25% emulsion of mineral oil was used. Mineral oil was used because a vegetable oil might contain a small amount of free fatty acids which would falsify the results. The triethanolamine (molecular quantities) was dissolved in the water and the fatty acid in the mineral oil. The solutions were agitated with a high speed mechanical mixer for 15 seconds and allowed to stand for 48 hours. Upon examining the samples, it was found that there was often a distinct tendency for the emulsion to "cream" even though it was not broken. If the emulsion was broken, the value of the emulsifier was indicated by the percentage of free oil and the percentage of "cream." The data are indicated in the following table:

	EMULSIFICATION.				
Fatty acid salt	5%	2.5%	1.0%	0.5%	0.25%
Isocaproate	–	–	–	–	–
Caproate	–	–	–	–	–
Caprylate	T C	–	–	–	–
Caprate	25% C 1% O	25% C 2% O	–	–	–
Laurate	+	+	24% C 4% O	17% C 10% O	16% C 13% O
Myristate	+	90% C T O	90% C T O	28% C T O	22% C 6% O
Palmitate	+	26% C 10% O	11% C 14% O	8% C 17% O	4% C 21% O
Stearate	+	+	+	25% C 3% O	15% C 12% O
Oleate	+	+	+	32% C 3% O	34% C 4% O

Legend: T = trace, C = cream, O = oil, – = cracked, + = emulsion.

SUMMARY.

A study of salts of triethanolamine indicated that the surface tension decreased and the relative foam production increased with the number of carbon atoms of the saturated fatty acid up to 12 and then decreased. The p_H increased with the number of carbon atoms. The stearate, oleate and laurate exhibited the best emulsifying powers.