

Table 2. Variation of methoxyl content with number of methylations.

Material	Weight, g	OCH ₃ , %
Unmethylated material	10.0	4.1
After 1st methylation	10.0	10.7
» 2nd »	9.9	15.4
» 3rd »	9.7	16.8
» 4th »	9.7	16.6

The nitrobenzene oxidations and the estimations of vanillin and veratric acid were carried out as described in previous communications 8,9.

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A new Solubilization Effect

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When hydrocarbons are solubilized by aqueous association colloid solutions the conductance is very little altered. When the solubilized substance is a polar compound such as a long-chain primary alcohol or fatty acid, a decrease in the con-

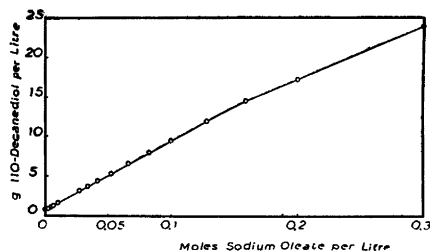


Fig. 1. The solubility of decanediol in sodium oleate solutions at 20° C.

ductance is frequently noted. The solubilization of the glycol, 1,10-decanediol, however, leads to a marked increase in the conductance. This latter phenomenon has not been described previously.

One of us has shown that sodium oleate solutions are able to solubilize fairly large amounts of 1,10-decanediol¹ and the saturation capacity of oleate was preliminarily estimated at about 66 g diol per mole oleate at 20° C. We have now conducted a more detailed study of the solubilization of decanediol. The solubility values were determined with a Zeiss-Löwe interferometer for liquids. The solubility in pure water and in salt solutions of low ionic strength is only 720–730 mg per liter at 20° C and 1 400 mg per liter at 40° C. These values are lower than those previously used and hence the amounts solubilized are actually greater. Fig. 1 shows the relation between the solubility of the diol at 20° C and the oleate concentration. Decanediol does not seem to be solubilized by oleate solutions below 0.0015 *M*. The increase in the solubility of decanediol is linear over a fairly wide oleate concentration range up to about 0.17 *M*. In this range the saturation capacity of the micellar oleate is 82 g decanediol per mole oleate, i.e. 0.5 mole decanediol per mole oleate.

As already mentioned, the solubilized decanediol brings about a marked increase in the conductance of the oleate

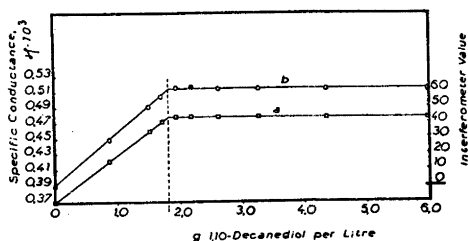


Fig. 2. a. The influence of decanediol on the specific conductance of a 0.0125 M sodium oleate solution.

b. The influence of decanediol on the interferometer value of a 0.0125 M sodium oleate solution.

solutions. Fig. 2 a shows that the specific conductance increases linearly with the amount of solubilized diol up to a maximum value. As Fig. 2 b shows, this value is attained when the solution is saturated by diol. After this point a further addition of diol has no effect on the conductance. The excess of the diol does not dissolve.

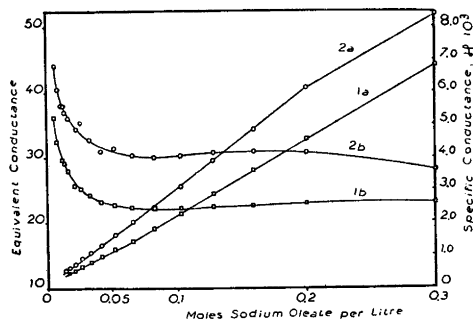


Fig. 3. The conductance of sodium oleate solutions at 20° C.

Curve 1 a: The specific conductance of pure oleate solutions.

Curve 1 b: The equivalent conductance of pure oleate solutions.

Curve 2 a: The specific conductance of oleate solutions saturated with decanediol.

Curve 2 b: The equivalent conductance of oleate solutions saturated with decanediol.

The variation of the specific and equivalent conductances in pure oleate solutions is shown in Fig. 3, curves 1 a and 1 b and that of oleate solutions saturated with decanediol in Fig. 3, curves 2 a and 2 b. The relative increase in conductance becomes rapidly greater at first until it attains a value of 33–39% at oleate concentrations between 0.03 and 0.2 M. Above the latter concentration the relative increase again diminishes.

We have found that the solubilization of decanediol by solutions of other paraffin chain salts also leads to an increase in the conductance. This is the case with solutions of sodium myristate, laurate and lauryl sulphate (*e.g.* in a 0.1 M solution of the latter the increase in the specific conductance is 58%), and hexadecyltrimethylammonium bromide (increase 41–50% in 0.005–0.02 M solutions). In these cases the solutions saturated with decanediol contain about 0.4–1 mole diol per mole micelle-forming substance. Decanediol is also solubilized by sodium cholate and desoxycholate solutions, but here no increase in conductance is observed and the molar ratio at saturation is lower.

The observed increase in conductance is not due to the presence of impurities in the diol nor can it be that the latter itself forms ions. The pH values of the solution are very little altered. Thus the increase must depend on changes in the micellar state of the association colloid. It seems possible that the solubilization of decanediol effects a rearrangement of the micelles by which the micelles become smaller and their number increases and the interionic forces between the micelles and gegenions diminish in strength.

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