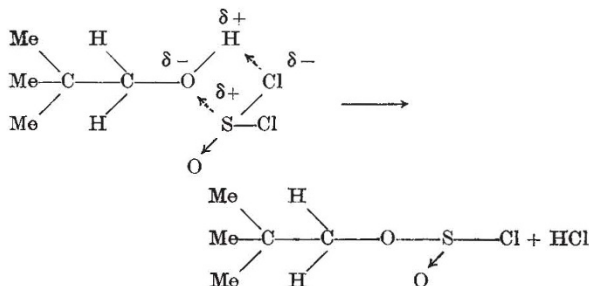


has been demonstrated"; but the work of Gerrard³ enabled us to predict probability of easy 'broadside' approach.

neo-Pentyl alcohol and thionyl chloride quite readily gave us the chlorosulphinate, $ROSOCl$, and in the presence of pyridine, the sulphite, R_2SO_3 , in excellent yields. Phosphorus trichloride, and tribromide in the absence of pyridine, produced the halogenophosphites, for example, $ROPCl_2$, while in the presence of pyridine, an ester of phosphorous acid was readily obtained. Phosphorus oxychloride in the presence of pyridine gave an ester of phosphoric acid. We conclude that *neo*-pentyl alcohol very readily responds to 'broadside' four-centre attack; for example:



We find that the hydroxyl group in α -dimethyl-*neo*-pentyl alcohol, a tertiary alcohol, is replaceable by halogen through the interaction with these reagents, in accordance with the theory of substitution developed by Ingold and Hughes.

Details of these experiments are being prepared for publication.

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¹ Whitmore and Rothrock, *J. Amer. Chem. Soc.*, **54**, 3431 (1932).

² Dostrovsky, Hughes and Ingold, *J. Chem. Soc.*, 173 (1946).

³ Gerrard, *J. Chem. Soc.*, 688 (1936); 99 (1939); 218 (1940); 85 (1944).

Precipitating Effect of Cationic Detergents on Soluble Starch

CATIONIC detergents, the bactericidal property of which was discovered by Domagk (1938), have a precipitating effect on certain proteins (Kuhn-Bielig, 1940). Since this precipitation occurs at high pH values, it is evident that it is due to salt-like bonds between the positively charged groups of the detergent and negative groups of the proteins. It is not surprising, therefore, that similar precipitates were observed when solutions of polysaccharidic acids, such as agar-agar, heparin, or gum arabic, were added to those of 'Desogen' (Geigy), that is, methyl-phenyl-dodecyl-trimethyl-ammonium methosulphate. In the course of these experiments it was observed, however, that polysaccharides devoid of acidic groups were also precipitated by 'Desogen'. Thus soluble starch (Merck, Schuchardt), dissolved in distilled water or in salt solution at different pH values, gave distinct precipitates. Two minima of turbidity were observed, one at a pH of 14 and another close to pH 7 (see table).

Each of the test tubes used in this experiment contained 160 mgm. of soluble starch, 40 mgm. of 'Desogen' and 20 ml. of 0.1 M borate buffer solution.

The intensity of the turbidities was measured nephelometrically. Then the precipitate brought about at a pH of 9.2 was centrifuged, dried and weighed. The quantity of the other precipitates was calculated by comparison of this value with the nephelometric values.

pH values: 0(=N HCl) 1 2.3 6.5 8.2 9.2 11 14(=0.1 N NaOH)
Precipitates (mgm.): 36.6 23 4.6 5.5 34 50 52 8.8

When starch and 'Desogen' were dissolved in distilled water, the amount of precipitate was negligibly small; a distinct precipitate was observed in isotonic and hypertonic solutions of sodium chloride.

The amount of precipitate depends on the relative concentration of both components. Maximal precipitates were obtained with mixtures containing 20 mgm. of 'Desogen' with 80 mgm. of soluble starch in 10 ml. of the buffer solution. The turbidity and the precipitates began to disappear when the solutions were heated to 30–40°, and the solutions became entirely transparent at 70°; on cooling, the precipitate appeared again. Moreover, we observed that the colour reaction of soluble starch given by iodine was inhibited by 'Desogen'. The blue colour was changed to a reddish-violet or to a pale yellow, depending on the amount of 'Desogen' added to the starch solution.

The details of these and other experiments will be published elsewhere.

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Muscle-Relaxing Ethers of Glycerol

THE discovery of the useful applications of curare in medicine and surgery has directed attention to other substances which are capable of producing muscular relaxation in man. In 1910, Gilbert and Descomps¹ administered the α -phenyl ether of glycerol to guinea pigs and observed: "Au bout d'un laps de temps variant, suivant la dose injectée, de trois minutes à dix minutes, on voit apparaître un certain degré de parésie des membres, parfois précédée de quelques rares et courtes contractures passagères. Cette paralysie incomplète est toujours transitoire, et sa durée oscille en général entre quinze et trente minutes; une seule fois, elle persista une heure." Launoy² studied the action of the same compound and observed a "résolution musculaire" and the antagonism of the drug to strychnine. Muscle-relaxing properties were later and independently observed in several glycerol ethers³, and one of these, the α -*o*-tolyl ether ('Myanesin'), was found to be effective in man⁴. The present note indicates some of the relationships which have been observed between the molecular structure of glycerol ethers and their muscle-relaxing power. For the purpose of discussion it is useful to consider the molecular median paralyzing dose ($P.D._{50}$ /mol. wt.) in mgm. per kgm., that is, the mole-fraction of the glycerol ether which is required to paralyse 50 per cent of white mice to which it has been administered subcutaneously.

The presence of the grouping $-O-CH_2-CROH-CR_2OH$ appears to be necessary for muscle-relaxing activity. Most of the β - and γ -alkyl derivatives of the α -ethers that we have tested are relatively inactive, as also are a few *O*-glucosides of active glycerol ethers. Some esters show activity of a low order, but this may be due to hydrolysis following injection. The