Anal. Calcd. for $C_{33}H_{42}OS_2$: C, 76.40; H, 8.16; S, 12.4. Found: C, 76.18; H, 8.53; S, 12.5.

Acetylation of IV (1 g.) in 5 ml. of acetic anhydride and 10 ml. of pyridine at room temperature for twenty hours and crystallization from acetone–water gave 1.02 g. (94%) of colorless needles, m. p. 150–152°, of the **dibenzylmercaptol of dehydroisoandrosterone acetate.**

Anal. Calcd. for $C_{35}H_{44}O_2S$: S, 11.4. Found: S, 11.4.

Dimercaptol of Dehydroisoandrosterone and Thioglycolic Acid (V).—In an analogous manner 2.88 g. (0.01 mole) of dehydroisoandrosterone, 2.8 g. of zinc chloride, and 5 g. of sodium sulfate were mixed and treated with 10 ml. of thioglycolic acid. The reaction mixture was poured into 500 ml. of water, giving a precipitate which was separated by filtration. Crystallization of the dimercaptol (V) from 100 ml. of acetone and 10 ml. of water gave 3.35 g. (73%) of material, m. p. 130–155°. Several recrystallizations from ethyl acetate gave colorless needles, m. p. 177–179°.

Anal. Calcd. for $C_{23}H_{34}O_5S_2$: S, 14.1. Found: S, 14.3.

Hydrolysis of the dimercaptol (V) in refluxing aqueous alcoholic hydrochloric acid gave dehydroisoandrosterone, m. p. 140–142°.

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A General Relation Among the Various Additive-Constitutive Physical Properties

BY FAUSTO W. LIMA

There have been found linear relations among some physical properties, like the one of R. T. Lagemann[1] between molecular refraction and Souder's viscosity constant, the numerical coefficients of which are obtained by the method of least squares.

Lagemann and Dunbar[2] showed also that molecular refraction, parachor, Souder's viscosity constant, van der Waals' b and molecular magnetic rotation are related to the molecular sound velocity[3] by linear relation; consequently, between any two of these properties there will also be linear relations.

We can show that there is a way of generalizing such relations and of obtaining new ones and, at the same time, of justifying them theoretically.

Let us consider the members of an homologous series of organic compounds; one can say that an additive–constitutive property F (like parachor, molecular refraction, Souder's viscosity constant, etc.) can be taken as n times the contributions of the CH_2 groups (where n are the number of CH_2 groups of the member of the homologous series) plus the contributions of any special characteristic of the series, like double bonds, triple bonds, carbonyls, carboxyls, or rings, etc.; one must include also the contributions of the hydrogen atoms that remain after putting CH_2 in evidence. We have then

$$F = nF_{CH_2} + F_1 \qquad (1)$$

where F_{CH_2} is the contribution of the group CH_2 and F_1 the contributions of the structural characteristic of the series plus the contribution of the hydrogen atoms that remain after putting CH_2 in evidence.

For another additive-constitutive property G one can write for the same series that

$$G = nG_{CH_2} + G_1 \qquad (2)$$

where the symbols have the same meaning as before but with regard to the G property.

By eliminating n between (1) and (2) we have

$$F = GF_{CH_2}/G_{CH_2} - G_1F_{CH_2}/G_{CH_2} + F_1 \qquad (3)$$

which is a linear relation

$$F = aG + b$$

The relation (3) shows why the slope F_{CH_2}/G_{CH_2} is the same for the components of any homologous series, as Lagemann[1] observed.

The equation (3) was tested for the relation Souder's viscosity constant (I)–parachor (P) and parachor (P)–molecular refraction (R) and the agreement between calculated and observed values was found to be less than 1%.

For the relation between I and P, $a = I_{CH_2}$ $P_{CH_2} = 55.6/40 = 1.4$, and b for the series studied is

Paraffins	−37.7
Alkyl bromides	−36.5
Alkyl chlorides	−35.9
Alkyl iodides	−34.9
Monohydric alcohols	− 3.8
Carboxyl acids (monobasics)	−19.7
Esters of acetic acid	−34.4
Esters of formic acid	−33.2
Esters of propionic acid	−39.8

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[2] R. T. Lagemann and Dunbar, *J. Phys. Chem.*, **49**, 428 (1945).

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Triethylenetetranitramine

BY G. N. R. SMART AND GEORGE F WRIGHT

The nitration of dialkylchloramines[1] and of monoalkyldichloramines[2] has recently been reported. It seemed of interest to inquire whether nitration would be successful in cases where these two types of chloramine linkage were incorporated into the same molecule. Triethylenetetramine was chosen as a type, and was N-chlorinated[3] to give N-hexachlorotriethylenetetramine, I.

We were unable to isolate the chloramine as a chemical individual. At best it decomposed slowly during evaporation of the solvent in which it was prepared; in the dry state it often decomposed explosively. However, a slight decomposition ought to be inconsequential since the more

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[1] G. S. Myers and G. F Wright, *Can. J. Res.*, **26B**, 257 (1948).

[2] G. N. R. Smart and G. F Wright, *ibid.*, **26B**, 284 (1948).

[3] L. K. Jackson, G. N. R. Smart and G. F Wright, THIS JOURNAL, **69**, 1539 (1947).