upon mixing with a moist ether solution of picric acid gave only imidazole picrate. In contrast with these properties the ketone (II) was resistant to hydrolysis by 0.5 N sodium hydroxide at reflux temperature and gave a picrate derivative, m.p. 204°.[1]

Attempts to acetylate benzimidazole, 2-methylbenzimidazole and lophine (2,4,5-triphenylimidazole) using isopropenyl acetate were unsuccessful.

Experimental[3]

1-Acetylimidazole (I).—A mixture of 2.0 g. (0.03 mole) of imidazole, m.p. 89–90°, and 20 ml. of isopropenyl acetate containing 10 drops of concentrated sulfuric acid in a 50-ml. round-bottomed flask equipped with a six-bulb Snyder column with condenser attached was heated sufficiently to keep the gas temperature at the top of the column at 60° for one hour. During this time acetone with traces of isopropenyl acetate was collected from the condenser. The reaction mixture was treated with anhydrous sodium carbonate to neutralize the sulfuric acid. The liquid portion was decanted from the solid and evaporated to dryness in a dry air stream at room temperature. A residue of colorless solid product remained, wt. 3.10 g. (94% yield), m.p. 93–96°. After three recrystallizations from isopropenyl acetate, analytically pure N-acetylimidazole was obtained with a constant m.p. 101.5–102.5° (bath preheated to 96°).

Anal. Calcd. for $C_5H_6ON_2$: C, 54.53; H, 5.49; N, 25.45. Found: C, 54.45; H, 5.38; N, 25.25.

The preparation of a picrate derivative which was attempted in moist ether gave a compound identical with the picrate of imidazole, m.p. and mixed m.p. 212.5–213.5°.[4]

Anal. Calcd. for $C_9H_7O_7N_5$: C, 36.37; H, 2.37; N, 23.57. Found: C, 36.53; H, 2.34; N, 23.50.

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[3] Microanalyses by Mr. Goji Kodama, Chemistry Department, University of Michigan.

[4] Oddo and Ingraffia[1] report a m.p. 212° but no analytical data. R. G. Fargher and F. L. Pyman, *J. Chem. Soc.*, **115**, 217 (1919), report a m.p. 212° and a nitrogen content of 23.3%.

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN

Densities of Mixtures. Water and Methanol

BY G. CHAPAS

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Writing on the densities of mixtures: water + methanol, Clifford and Campbell stated that *no simple equation (of third degree or less) can represent the results of their determinations.*[1] However computation of the specific volumes or, better, of the molal volume V of these mixtures shows that additivity is almost satisfied on the whole scale of composition; more precisely the volume of a mixture is very nearly equal to the sum of the volumes of its constituents, the deviation being not larger than 3% for about $N = 0.5$.

The mean molal volumes calculated from the authors' data are given in the second column of Table I for each value of the mole fraction N of methanol.

By application of the method of least squares, we get the equation

$$V = 18.088_6 + 18.676_5\,N + 3.988\,N^2 \qquad \text{(A)}$$

The coefficient of the third degree term would be very small and it is preferable to neglect it.

The values of V drawn from this equation are written in the third column of the table.

TABLE I

	Molal volume V, ml.	
Mole fraction, N	From authors' data	From equation (A)
0.000 00	18.069	18.069
.049 98	19.056	19.012
.137 79	20.693	20.718
.238 20	22.742	22.744
.375 28	25.624	25.639
.519 84	28.843	28.855
.589 01	30.448	30.453
.789 02	35.301	35.288
.866 74	37.266	37.252
1.000 00	40.721	40.721

We may also draw from equation (A) the expressions of the partial molal volumes[2]

$$\text{Methanol}\quad V_2 = V + (1 - N)\frac{dV}{dN} = 36.745_1 + 7.976\,N - 3.988\,N^2$$

$$\text{Water}\quad V_1 = V - N\frac{dV}{dN} = 18.068_6 - 3.988\,N^2$$

or by setting $N = N_2$, $1 - N = N_1$

$$V_1 = 14.081 + 7.976\,N_1 - 3.988\,N_1^2$$

$$V_2 = 36.745 + 7.976\,N_2 - 3.988\,N_2^2$$

Then the partial molal volume V_1 of water is always decreasing and gets the minimum value for $N_1 = 0$, $V_1^0 = 14.081$ ml. in almost pure methanol; again methanol finds its minimum partial molal volume for $N_2 = 0$, that is, in pure water, $V_2^0 = 36.745$ ml.

It is not surprising that no simple equation can represent the densities of the mixtures since the molal volumes are very near to being additive; then the densities must be hyperbolic functions of the mole fraction N so that computation of a linear, or parabolic, or higher degree equation is without object. Emphasis must be put on the role played by the molal volume in physical chemistry and we must regret to read many interesting communications in which synthesized compounds are characterized only by melting point, boiling point or refractive index, density being lacking or given without a fairly good approximation. We might rather hope that such a constant be measured at several temperatures and the corresponding molal volumes calculated.

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[1] G. Clifford and J. A. Campbell, THIS JOURNAL, **73**, 5449 (1951).

[2] G. N. Lewis and M. Randall, "Thermodynamics," McGraw-Hill Book Co., Inc., New York, N. Y., 1923.

INSTITUT DE CHIMIE
FACULTÉ CATHOLIQUE DES SCIENCES
LYON, FRANCE

Chlorophenylsilanes

BY CHARLES A. BURKHARD

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Organopolysiloxane oils which contain chlorophenyl groups have been prepared and their lubricating properties studied. The preparation of these chlorophenyl-group-containing organopolysiloxane oils required that several new silanes be prepared and characterized: methyl-*p*-chlorophenyldichlorosilane, methylbis-*p*-chlorophenylchlorosilane and methyl-*m*-chlorophenyldichlorosilane. 1,3,5-Tris-*p*-chlorophenyl-1,3,5-trimethyl-