Mallinckrodt reagent toluene was fractionated after repeated treatments with sodium wire. The purified product had a density of d^{25}_4 0.86216, and a refractive index of n^{25}_D 1.49375.

The water was distilled from alkaline permanganate through a block tin condenser.

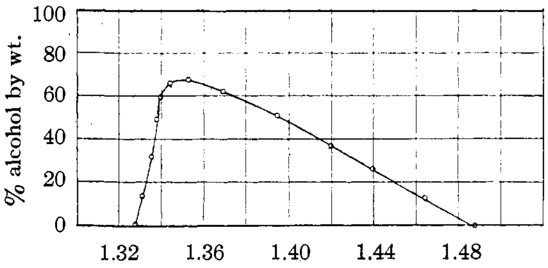

Fig. 1.

Procedure.—A series of solutions of alcohol and toluene was prepared, and water added to each solution to its saturation point at 25°. The refractive indices of these equilibrium solutions were determined at 25° with an immersion refractometer. All solutions were prepared by weight and precautions were observed to prevent evaporation during weighing, titration, and measurements of refractive indices. These data are shown in Table I.

TABLE I

REFRACTIVE INDICES OF EQUILIBRIUM SOLUTIONS AT 25°

Weight of components			
Wt. % toluene	Wt. % alcohol	Wt. % water	Ref. ind. of solutions
91.28	8.32	0.40	1.47764
86.24	13.02	.74	1.46935
72.40	26.22	1.37	1.44474
60.37	36.84	2.79	1.42537
43.94	50.56	5.51	1.39982
26.99	62.15	10.86	1.37455
14.72	67.35	17.91	1.35771
7.20	65.73	27.06	1.34880
2.83	59.40	37.77	1.34478
1.37	53.12	45.50	1.34331
0.50	41.06	58.43	1.34186
.14	24.00	75.87	1.33860
.06	6.72	93.23	1.33416
Toluene saturated with water			1.49295
Water saturated with toluene			1.33271

TABLE II

REFRACTIVE INDICES OF CONJUGATE SOLUTIONS, AND DISTRIBUTION OF METHYL ALCOHOL BETWEEN THE CONJUGATE SOLUTIONS

Water layer		Toluene layer		
Wt. % alc.	Ref. index	Wt. % alc.	Ref. index	Dist. ratio
2.5	1.33326	0.0	1.49290	
10.1	1.33521	.1	1.49273	0.01
15.4	1.33646	.2	1.49247	.01
22.0	1.33810	.2	1.49236	.01
32.2	1.34026	.4	1.49193	.01
40.6	1.34175	.8	1.49140	.02
42.8	1.34205	2.2	1.48873	.05

The nature of the curve formed by plotting weight percentages of alcohol against refractive indices has been discussed. (1) A ternary solubility diagram for this system reveals that homogeneous solutions exist only in a relatively small concentration area.

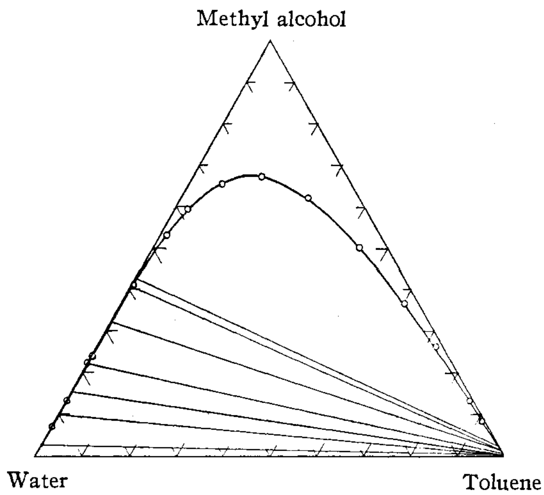

Fig. 2.

A series of mixtures of methyl alcohol, toluene and water which separated into two layers was prepared, and the refractive index of each layer measured at 25°. The measurements of refractive indices served as a measure of the weight percentages of alcohol in the two layers. These observations, together with the calculated distribution ratios of alcohol in the conjugate layers, are recorded in Table II. Lack of constancy in the distribution ratios is probably due, in part at least, to the increased miscibility of water and toluene in the presence of the methyl alcohol.

AVERY LABORATORY OF CHEMISTRY
UNIVERSITY OF NEBRASKA
LINCOLN, NEBRASKA
RECEIVED MAY 29, 1937

Nitroguanyl Hydrazones of Some Aldehydes and Ketones

BY G. B. L. SMITH AND EARLE P. SHOUB[1]

Nine new nitroguanyl hydrazones of aldehydes and ketones have been prepared by following the

(1) This note is an abstract of the thesis submitted by Mr. Shoub in partial fulfilment of the requirements for the degree of Bachelor of Science in Chemistry in June, 1937. Contribution No. 37 from the Department of Chemistry of the Polytechnic Institute of Brooklyn.

method of Whitmore, Revukas, and Smith.[2] The method consists, essentially, of treating nitroaminoguanidine with the aldehyde or ketone in an aqueous or dilute alcoholic medium to which a very small amount of acetic acid has been added. The crystals formed upon cooling the mixture were recrystallized from 50% ethyl alcohol and their melting points determined.

Aldehyde or ketone	Appearance	M. p., °C.	Dumas nitrogen analyses, % Calcd.	Found
Crotonaldehyde	White crystals	177.5	40.93	40.90
Hexone	White flakes	112.5	34.82	35.01
Octyl aldehyde	White crystals	118	31.95	32.43
Acetaldehyde	White crystals	234	48.24	48.35
Heptaldehyde	White crystals	93	32.53	32.72
Butyraldehyde	White crystals	95	40.20	40.00
Acetoacetanilide	White crystals	184	31.46	31.66
Methyl *n*-amyl ketone	White crystals	109.5	32.53	32.64
Veratric aldehyde	Yellow crystals	195	26.22	26.43

(2) Whitmore, Revukas and Smith, THIS JOURNAL, **57**, 706 (1935).

The nitroaminoguanidine required was prepared by the hydrazinolysis of nitroguanidine as first suggested by Phillips and Williams.[3]

Nitroaminoguanidine is a very useful addition to the aldehyde and ketone condensing agents. It may be employed in an aqueous medium and yields a crystalline product in less than five minutes, in all cases which we have reported.

(3) Phillips and Williams, *ibid.*, **50**, 2465 (1928).

BROOKLYN, NEW YORK RECEIVED JULY 10, 1937

COMMUNICATIONS TO THE EDITOR

THE ATOMIC WEIGHTS OF SODIUM AND CARBON

Sir:

The results of recent chemical determinations of the atomic weight of carbon by the combustion of hydrocarbons [Baxter and Hale, THIS JOURNAL, **59**, 506 (1937)] and by the titration of benzoyl chloride with silver [Scott and Hurley, *ibid.*, **59**, 1905 (1937)] indicate that the atomic weight of carbon is very close to 12.010. It is of interest to use this value for carbon in the calculation of the atomic weight of sodium from existing measurements of mass ratios involving sodium carbonate.

Four such ratios have been determined accurately: $Na_2CO_3:I_2O_5$ [Baxter and Hale, *ibid.*, **56**, 615 (1934)], $Na_2CO_3:2Ag$, $Na_2CO_3:2AgBr$, and $Na_2CO_3:Na_2SO_4$ [Richards and Hoover, *ibid.*, **37**, 95, 108 (1915)]. The last ratio is, however, unsuitable for this calculation since it requires the use of values for carbon and sulfur known to four decimals in order to obtain sodium to three. On the other hand, if there is no experimental error inherent in the determination of the other three ratios, they should prove to be the best chemical determinations of the atomic weight of sodium yet performed, since the weight of two gram atoms of sodium is directly calculable from the experimental ratios. Employing the value 12.010 for carbon and the current International values for silver, bromine, and iodine, the following values for the atomic weight of sodium are obtained from the three ratios

$Na_2CO_3:2Ag$	22.993
$Na_2CO_3:2AgBr$	22.993
$Na_2CO_3:I_2O_5$	22.994

These values are in good agreement, but are somewhat lower than the present accepted value for sodium, 22.997. They are, however, in agreement with the value 22.994 obtained by Johnson [*J. Phys. Chem.*, **37**, 923 (1933)] from a determination of the ratio NaCl:Ag.

Since no determination of the atomic weight of sodium by the mass-spectrograph method has been made, it is impossible to seek verification of these low values from this source. A physical value, 22.9972, has, however, been obtained recently by Pollard and Brasefield [*Phys. Rev.*, **51**, 8 (1937)] from a study of the nuclear reaction $Ne^{20} + He^4 \longrightarrow Na^{23} + H^1$. When converted to the chemical scale with the factor 1.00025 the value 2.9915 is obtained for sodium. While this value may not be as accurate as the number of significant figures would indicate, it is near enough to those obtained from the sodium carbonate ratios and to Johnson's value to be looked upon as confirming a lower value for sodium. Although any final judgment at this time is probably premature, this concordance suggests that the pres-