Citation:

Dito, J.W., The densities of mixtures of hydrazine and water, in:
KNAW, Proceedings, 4, 1901-1902, Amsterdam, 1902, pp. 756-758

Mr. J. J. HUISMAN, dairy-inspector took part in the experiments with the beet-foliage.

Government-Agricultural-Experiment-Station
Groningen.

EXPLANATION OF THE GRAPHIC REPRESENTATIONS.

Fig. I. Influence of feeding with beet-foliage on the R.M.W.-numbers (amount of volatile fatty acids) of milkfat.
The dates of sample-taking are put down on the X-axis, the R.M.W.-numbers on the Y-axis.

Fig. II. Influence of feeding with beet-foliage on the refractionnumbers of milkfat.
On the X-axis the dates, on the Y-axis the refractionnumbers have been put down.

Fig. III. Influence of feeding with sugar on the R.M.W.-numbers of milkfat.
On the X-axis the dates, on the Y-axis the R.M.W.-numbers have been put down.

Fig. IV. Influence of feeding with molasses and with sugar on the R.M.W.-numbers of milkfat.
On the X-axis the dates have been put down; on the Y-axis the R.M.W.-numbers.

Chemistry. — "*The densities of mixtures of hydrazine and water.*" By Mr. J. W. DITO. (Communicated by Prof. C. A. LOBRY DE BRUYN).

Some years ago I was able to prepare hydrazine, a substance previously unknown in the free state (discovered in the form of its compounds by CURTIUS) and to study many of its properties [1]). Several physical constants [melting point, boiling points at different pressures, specific gravity, index of refraction [2]), critical temperature and heat of dilution [3])] were then determined.

The study of hydrazine has not since been continued. Still it was deemed of importance to again take up the study of a substance which belongs to a class of liquids of comparatively simply constitution: $H_2N.NH_2$ closely related to ammonia, miscible with water with considerable evolution of heat and according to several of my experiments, a good solvent for many salts.

Mr. DITO has now in the first place commenced with the determination of the densities of mixtures of water and hydrazine. This was of all the greater importance because CURTIUS had stated that

1) Versl. Akad. Juni 1895. Recueil, **13**. 433, **14**. 88, **15**. 174.

2) By Prof. J. F. EYKMAN.

3) With Dr. REICHER.

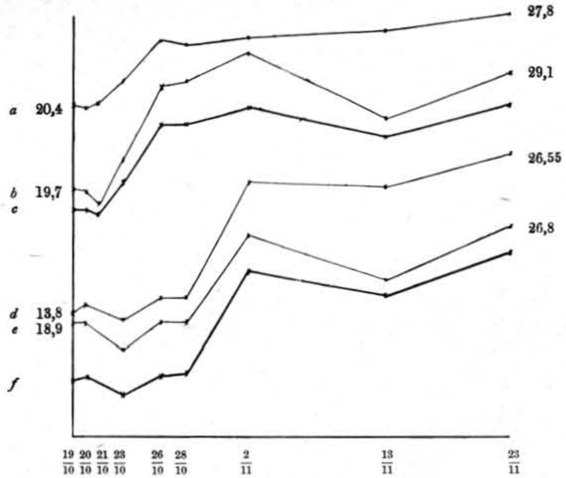


Fig. I. Influence of feeding with beet-foliage on the contents of volatile fatty acids (R. M. W.-number) of the milkfat.
a curve for cow No. 1. *b* curve for cow No. 2.
c combined curve for No. 1 & 2. *d* curve for cow No. 3.
e curve for cow No. 4. *f* combined curve for No. 3 & 4.

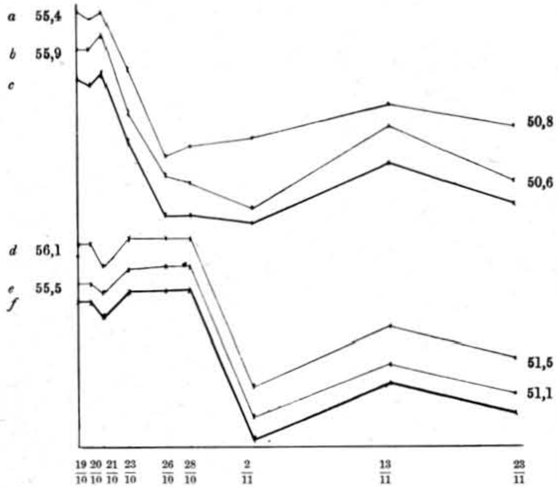


Fig. II. Influence of feeding with beet-foliage on the refraction-number of the milkfat.
a curve for cow No. 1. *b* curve for cow No. 2.
c combined curve for No. 1 & 2. *d* curve for cow No. 3.
e curve for cow No. 4. *f* combined curve for No. 3 & 4.

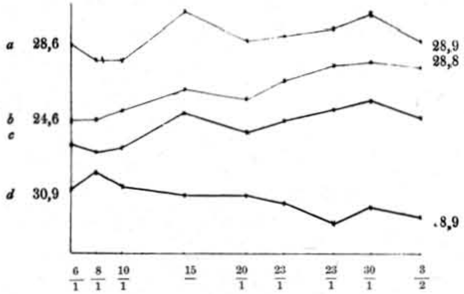


Fig. III. Influence of feeding with sugar on the contents of volatile fatty acids (R. M. W.-number) of the milkfat.
a curve for cow No. 2. *b* curve for cow No. 3.
c combined curve for No. 2 & 3. *d* curve for the controlling cow.

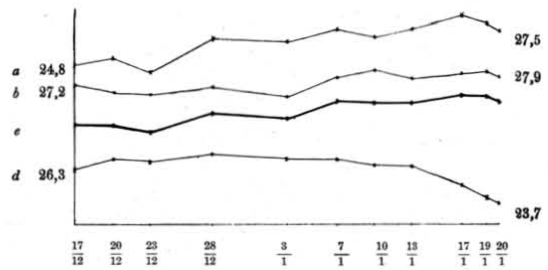


Fig. IV. Influence of feeding with molasses and with sugar on the contents of volatile fatty acids (R. M. W.-numbers) of the milkfat.
a curve for cow No. 1. *b* curve for cow No. 3.
c combined curve for No. 1 & 3. *d* curve for the controlling cow.

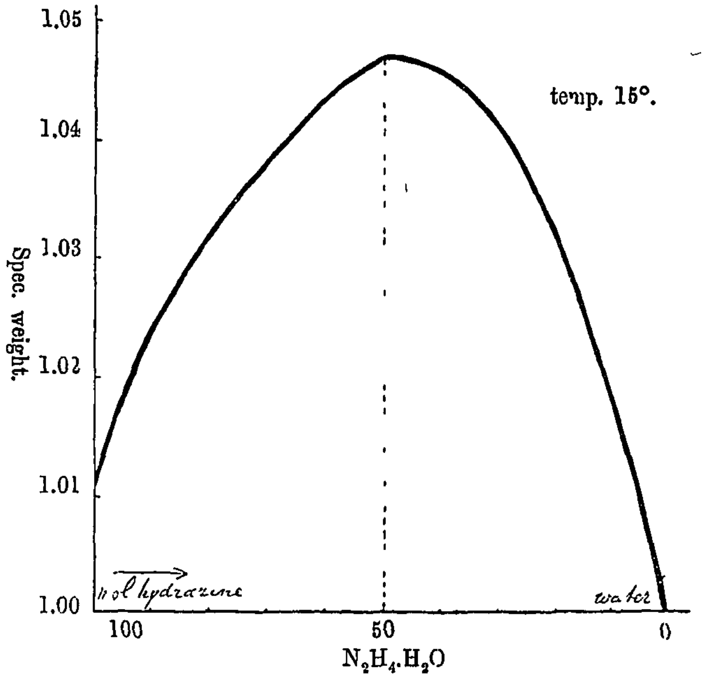
if one tries to liberate hydrazine from the aqueous solutions of its salts by bases, it is always combined with water and yields on distillation a hydrate of the composition: N_2H_4-H_2O which boils at 119° and in which the water is very firmly united with the hydrazine.

Since free hydrazine (b.p. 113°.5) had become accessible it was possible to investigate the whole system hydrazine + water and to see whether the existence of CURTIUS's constant-boiling hydrate would show itself in the curve of the specific gravities of the mixtures. It was *a priori* not improbable that this should be the case and experiment has confirmed this idea.

From the subjoined table in which each figure is the result of two or more concordant determinations and from the curve constructed with the aid of these figures, it appears that on mixing hydrazine with water a contraction takes place. It will be noticed that the maximum density corresponds with the formula $N_2H_4.H_2O$.

$^0/_0N_2H_4$	mol. N_2H_4 on 100	spec. weight $d\frac{15}{4}$
100.0	100	1.0114
90.8	84.1	1.0300
84.0	74.7	1.0358
80.0	69.25	1.0379
78.5	67.25	1.0400
74.9	62.65	1.0421
72.0	59.15	1.0440
67.4	53.75	1.0464
64.1 [1]	50 15	1.0470
59.9	45.7	1.0464
55.3	41.0	1.0461
46.4	32.75	1.0425
40.85	28.0	1.0389
34.25	22.65	1.0340
26.45	16.85	1.0272
14.0	8.4	1.0142

[1]) Nearly N_2H_4 H_2O.



It will be seen that the system $N_2H_4+H_2O$ behaves in an analogous manner to the system SO_3+H_2O which has been recently studied by KNIETZSCH in his well-known research on sulphuric acid.

Here we also meet with contraction; there does not, however, exist a maximum density for $SO_3.H_2O$, (but for 2 $SO_3.H_2O$) which phenomenon may be explained by the great difference in density of the two components.

Efforts will be made to determine the boiling point curve for the system $N_2H_4+H_2O$ (or at least for $N_2H_4.H_2O+H_2O$).

Chemistry. — *"A method for separating crystals from alloys".* By Dr. C. VAN EYK. (Communicated by Prof. H. W. BAKHUIS ROOZEBOOM).

The following methods have, up to now, been applied in investigating the constitution and structure of metallic alloys.

1. Microscopical examination of polished surfaces so as to distinguish the several crystalline elements often rendered more conspicuous by etching (BEHRENS, OSMOND and others).

Differentiation of crystalline elements presents as a rule no great difficulties but it is difficult to come to a proper conclusion as a quantitative analysis is seldom possible. In some cases it is possible