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On the Alcoholic Fermentation of the Amino-acid. Part III.

α -amino-*n*-butyric acid.

By

Masakazu YAMADA.

(Imp. Brew. Experimental Station, Takinogawa machi near Tokyo.)

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Abderhalden, Chang and Wurm obtained *l*-isomeride as the decomposition product by yeast from *r*-amino-*n*-butyric acid and supposed that *d*-component was the naturally occurring isomeride. But then they did not pay attention to the volatile products. According to Ehrlich's view *n*-propyl alcohol ought to be produced from the amino acid.

The author's experiment showed that the fusel oil fraction produced by saké yeast in the modified Hayduck solution with this amino acid in place of asparagine consisted mainly of an amyl alcohol which boiled at about 123~8°. From the rotatory power of the alcohol and the properties of two derivatives, this was identified as active amyl alcohol.

Experimental.

d-l- α -amino-*n*-butyric acid was prepared from *n*-propyl alcohol merck.

Medium: Cane sugar 100 g., amino acid 3 g., Hayduck mineral solution 20 c.c., water 980 c.c.

1 to 2.5 l. of culture medium in a 2 to 5 l. flask was sterilized in ordinary way and then saké yeast was added—23 g. as dry yeast for total 13.2 l. of the medium. After 11 days at 25~9° the fermentation was over and the fermented liquid contained no sugar. The distillation and the treatment of the residue are the same as the case of alanine (see part II).

	Alcohol	Total acid	Fusel oil
Fermentation products	4.4%	0.1416%	0.07%
Yield of alcohol	632 c.c. (93%)	24 (90%) (fusel oil 0.768 g.)	oil (B. P. over 100°) 7.3 g.

Fractionation of the oil.

	B. P.	Yield (g.)		B. P.	Yield (g.)
I	100~107°	0.2	V	126~127.5°	1.7
II	107~116°	0.3	VI	127.5~128.5	2.0
III	116~123°	0.1	VII	residue	0.5
IV	123~126°	1.7			

Identification of the fractions.

The following derivatives of alcohol were prepared.

Phenyl carbamate :—

Fract.	M. P.	Analysis				
		Subst. (g.)	N (c.c.)	T.	P. (m.m.)	N (%) found
IV	32.5°	0.0715	4.2	15°	765	6.93
Act. amyl alcohol	30°					6.76 (C ₁₂ H ₁₇ O ₂ N)

3-5-dinitrobenzoate :—

Fract.	M. P.	Analysis				
		Subst. (g.)	N (c.c.)	T.	P. (m.m.)	N (%) found
IV	80°	0.0564	4.7	15°	768.3	9.89
V	81.5	0.0666	5.7	15	760.5	10.05
Amyl alcohol						9.93 (C ₁₂ H ₁₄ O ₆ N ₂)

Rotation of alcohol (mixture of IV, V, VI).

$$[\alpha]_D^{25} = -5.55^\circ \quad r = -3.62^\circ \quad l = 2.2 \text{ dm.} \quad c = 29.64\%$$

$$[\alpha]_D^{20} = -5.90^\circ \quad (\text{methyl ethyl carbin carbinol}).$$

Amino acid recovered from the distilling residue was 7.6 g. and its rotation in 20% HCl solution was following.

$$[\alpha]_D^{20} = -1.14^\circ \quad r = -0.16^\circ \quad l = 2.2 \text{ dm.} \quad c = 6.37\%$$