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## ISOTACHOPHORESIS

### APPLICATION NOTE No. 2

## DETERMINATION of ORGANIC ACIDS in SILAGE

#### MAIN FEATURES :

Aliphatic organic acids are usually the major fermentation products present in silage, therefore their contents is a main criterion of quality of the silage. Isotachophoresis is a suitable method for their determination because in 10-15 minutes it is possible to analyse the main components (formic, acetic, lactic, propionic, butyric acid, PO<sub>4</sub> or other interesting components). Reproducibility of the method is approximately 2% and pre-treatment of the sample is very simple (dilution). A similar result can be obtained in the analysis of rumen liquids.

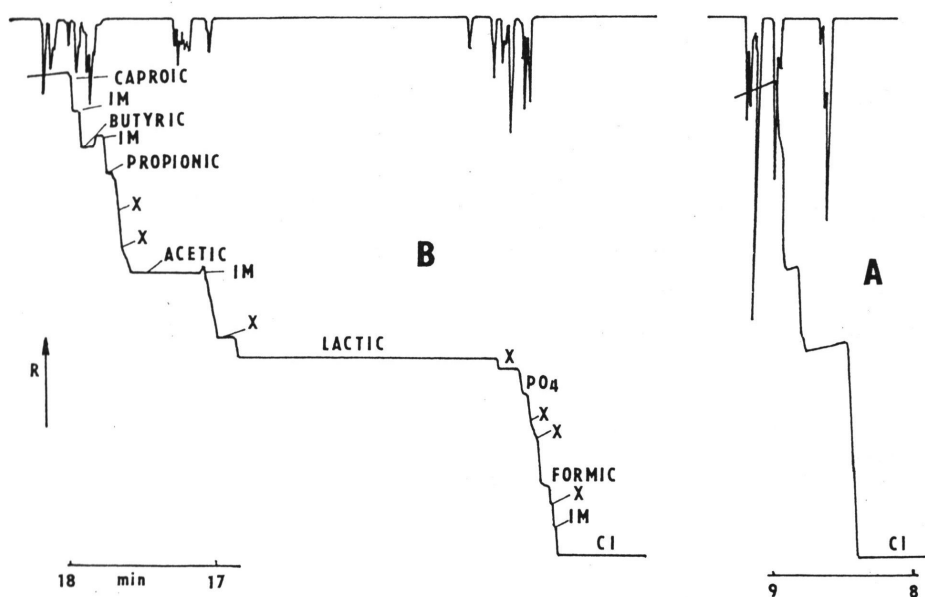


Fig. 1 : Isotachophoreogram of silage extract :

A – record from preseparation column /  $I_1 = 250 \mu A$

B – record from analytical column /  $I_2 = 50 \mu A$

X – unidentified zones, NR – impurities from solution

Determined concentration /in %/ :

formic - 0,07; PO<sub>4</sub> - 0,20; lactic - 2,10; acetic - 0,89; propionic - 0,05; butyric - 0,19

Conditions : leading electrolyte (LE):

$10^{-2}$  M HCl +  $2,2 \cdot 10^{-2}$  M  $\epsilon$ -aminocaproic acid + 0,1% methylhydroxyethylcellulose /MHEC/

terminating electrolyte (TE):

$5 \cdot 10^{-3}$  M caproic acid

Sample : 100g of silage extracted in 900 ml water /16 hours/, diluted 1:250

V=30  $\mu$ l

Reproducibility comparison of the classical (distillation and potentiometric titration) and ITP methods is shown in Table 1. Corn silage was analysed. Results were calculated from five experiments.

Tab.1

	Content in sample /%/					
	formic	lactic	acetic	propionic	butyric	valeric
classic	-	1,158+/-0,166	0,863+/-0,171	-	1,021+/-0,067	-
ITP	0,09+/-0,017	0,953+/-0,033	0,839+/-0,009	0,190+/-0,014	0,445+/-0,008	0,194+/-0,016

Results from model mixture with known content of the compounds are listed in Table 2. Results were calculated from three experiments and were compared with results obtained by classical methods.

Tab.2

	Content in sample /%/					
	formic	lactic	acetic	propionic	butyric	valeric
real	0,25	1,1	1,0	0,5	0,5	0,25
classic	-	1,179+/-0,138	1,501+/-0,159	-	1,120+/-0,324	-
ITP	0,240+/-0,030	1,067+/-0,062	1,054+/-0,047	0,518+/-0,015	0,499+/-0,030	0,270+/-0,015

Literature:

1. K.Šimo , Atestačná práca, ŠVÚ, Spišská Nová Ves, 1985

**CZE and ITP analysers are produced by :**  
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