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ISOTACHOPHORESIS

APPLICATION NOTE No. 12

DETERMINATION of NITRATES and NITRITES in VEGETABLES

MAIN FEATURES:

Isotachophoresis is a very simple and reliable method for determination of nitrates and nitrites in vegetables. Only a very simple sample pre-treatment is needed: homogenization and extraction in water. Practically no interference of constituents can disturb the analysis. The results were compared with more tedious spectrometric methods. To achieve lower detection limits, the leading electrolyte, with a lower concentration of lead ion was used in analytical column.

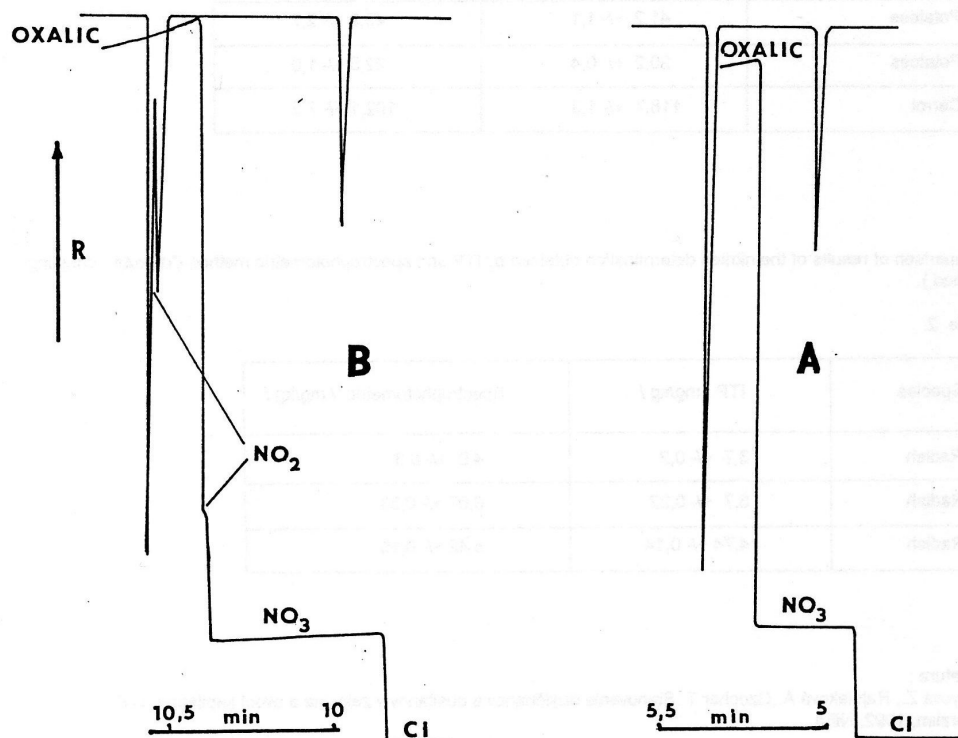


Fig. 1 : Isotachophoreogram of radish extract (10g in 100 ml water)

Determined concentrations : 2100 mg NaNO₃ and 3,3 mg NaNO₂ in 1 kg of the sample

A – preseparation column B – analytical column

Conditions :

leading electrolyte (LE):

preseparation column : $8 \cdot 10^{-3}$ M Cl + $1.5 \cdot 10^{-3}$ M Ba²⁺ + β -alanine + 0,1HEC , pH=4,0

analytical column : $4 \cdot 10^{-3}$ M Cl + $1 \cdot 10^{-3}$ M Ba²⁺ + β -alanine , pH=4,0

terminating electrolyte (TE):

10^{-3} M oxalic acid (caproic acid) + TRIS

$I_1 = 200 \mu A$, $I_2 = 15 \mu A$, $V=30 \mu l$

Detection limit (10 g of the sample in 100 ml of the water) is for nitrates (expressed as NaNO_3) 60 mg NaNO_3 in preseparation and 2,5 mg in analytical column, and for nitrites (expressed as NaNO_2) is 3 mg NaNO_2 .

Comparison of the results of nitrates determination obtained by ITP and spectrophotometric method (3,4-xylen)

Table 1

Species	ITP (mg/kg)	Spectrophotometric
Radish	2591 +/- 45	2723 +/- 45
Lettuce	2641 +/- 15	2699 +/- 86
Children fruit mixture	19,9 +/- 0,9	21,3 +/- 1,1
Frozen fruit mixture	184,1 +/- 1,2	181,4 +/- 3,5
Cauliflower	41,0 +/- 0,6	42,7 +/- 1,1
Potatoes	41,2 +/- 1,1	43,9 +/- 2,7
Potatoes	20,2 +/- 0,4	22,5 +/- 1,1
Carrot	118,7 +/- 1,3	102,1 +/- 7,2

Comparison of results of the nitrites determination obtained by ITP and spectrometric method (diazote – coupling method)

Table 2.

Species	ITP (mg/kg)	Spectrophotometric (mg/kg)
Radish	3,7 +/- 0,2	4,0 +/- 0,3
Radish	5,7 +/- 0,22	6,07 +/- 0,33
Radish	4,74 +/- 0,14	4,42 +/- 0,15

Literature :

Királyová Z., Rajniaková a., Czocher T., Stanovenie dusičnanov a dusitanov v zelenine a ovocí kapilárnou ITP, Laboralim, 1992, Nitra

CZE and ITP analysers are produced by :
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