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CAPILLARY ELECTROPHORESIS
and I S O T A CH O P H O R E S I S

APPLICATION NOTE No. 19

DETERMINATION of EDTA in MAYONNAISE

MAIN FEATURES:

Quality and term for use of mayonnaise, mayonnaise sauce and dressings are influenced mainly by oxidative changes of present fat. EDTA is used as very effective antioxidiser but its content is limited (75 mg/kg). Therefore it is necessary to use suitable method for its determinatrion. There are several procedures (HPLC, ITP), however all need very exacting pre-treatment of sample. On-line detection by ITP and CZE with UV detection of EDTA-Fe(III) complex enables to determine EDTA in mayonnaise only with minimum sample pre-treatment.

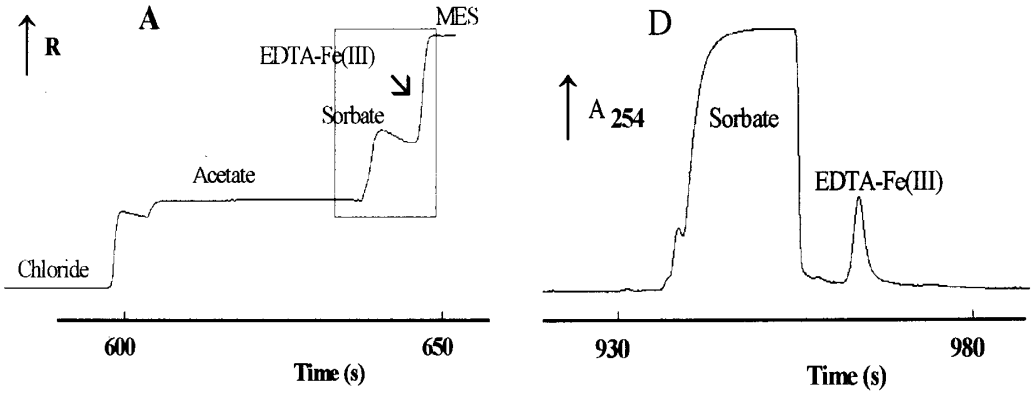

Fig. 1 : Record of mayonnaise analysis (2g/100ml) in operating system I
A – step ITP, conductivity detection of preseparation column
D – step CZE, UV detection of analytical column
Content of EDTA is 71 mg/kg detector

Conditions : operating system I

leading electrolyte (LE): 10 mM HCl + 20 mM histidine + 0,1% hydroxypropymethyllcellulose

terminating electrolyte (TE): 5nM morpholinethansulphonic acid (MES) + 20 mM histidine

carrier electrolyte : 25 mM MES + 10 mM bis-tri-propane

V=30 μl, I_1 = 250 μA, I_2 = 150 μA , analysis time : 15-20 minutes

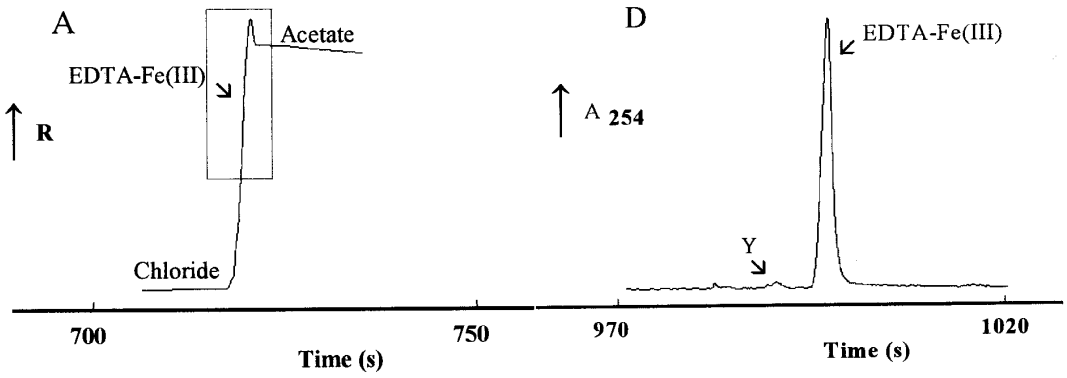

Fig. 2 : Record of mayonnaise analysis (2g/100ml) in operating system II
A – step ITP, conductivity detection of preseparation column
D – step CZE, UV detection of analytical column
Content of EDTA is 71 mg/kg detector, Z – unknown component in sample

Conditions : operating system II

leading electrolyte (LE): 10 mM HCl + 14 mM β-alanine + 0,1% hydroxypropymethyllcellulose

terminating electrolyte (TE): 5mM acetic acid

carrier electrolyte : 100 mM acetic acid + 20 mM β-alanine

V=30 μl, I_1 = 250 μA, I_2 = 150 μA , analysis time : 15-20 minutes

Sample treatment :
Weight 2 g of mayonnaise sample into 100 ml volumetric flask, add ca 75 ml water and 1 ml solution of iron salt (10 mM $FeCl_3.6H_2O$ + 5 mM HCl), thoroughly mix and put it into supersound for 1 min. After fulfilling to mark and centrifuging resp. filtration you can analyse this sample.

Results :
The advantage of operation system I is possibility to determine sorbic and acetic acid next to the EDTA. Disadvantage is more complicated record from UV detector which can influate the determination of EDTA (see Fig. 1). Operation system II provides very simple UV record and it is more suitable for EDTA determination (see Fig.2).
Dependence of the EDTA-FE(III) area peak on concentration is linear in the range of 0,04 up to 1 nmol of EDTA. (UV record from analytical column of the CZE step).
Reproducibility of the method expressed as relative standard deviation at concentration level of 75 mg/l is 2%. Back test at the level of 75 mg of EDTA/kg is 97%. Detection limit is 5.10^{-8} mol of EDTA/l, it is 3 mg/kg of the sample.

Literature :
F. Kvasnička, K.Miková,: Determination of EDTA in Mayonnaise by On-line Coupled Capillary Isotachophoresis – Capillary Electrophoresis with Photometric Detection, J Food Comp. And Anal., 9, 231-242(1996).

CZE and ITP analysers are produced by :

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