

Advanced Structured Materials

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Bioactive Natural Products for Pharmaceutical Applications

 Springer

Editors

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Chapter 8

Capillary Electrophoresis: A New Evolutionary Platform of Plant Secondary Metabolites

Dilipkumar Pal and Souvik Mukherjee

Abstract Capillary electrophoresis (c.e) is a modern S_{pt} technique other than any other chromatographic technique for the detection of plant secondary metabolites (Psm). There are two types of c.e such as capillary zone electrophoresis (c.z.e) and micellar electro kinetic (M.e.k.c.c). All kinds of secondary metabolites (S_m) (flavonoids, cardiac glycosides, aglycones, steroids, diterpene, saponin, etc.) are not possible to isolate with the help of HPLC and Gas chromatography. But such type of metabolites may possibly be isolated with the help of c.e smoothly and easily. However, in c.e charged molecules are transferred to the opposite charged molecules in the presence of the electrical field. Very low solvent, low price silica columns, and small amount of samples are needed to run the c.e. There are various characteristics such as voltage (V_{tg}), temperature, electrolyte concentration, B_F pH, micelle concentration, and organic modifiers may influence the S_{pt} of different S_m . In this book chapter we will describe the different parameters of c.e like methodology, detector sample analysis, and combination of other hypnated technique for the detection of metabolites.

Keywords Capillary zone electrophoresis · Micellar electro kinetic capillary chromatography · Phenolics · Alkaloids · Terpenoids

Abbreviation

A_{NT}	Acetonitrile
Alkd	Alkaloid
A_{ACT}	Ammonium acetate
BRT	Borate
B_F	Buffer
BFS	Buffer solution
C.e	Capillary electrophoresis
C.w	Capillary wall

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C.z.e	Capillary zone electrophoresis
C.n	Coumarin
Esp	Electrolyte solution parameter
ESOP	Electro-osmotic pressure
E.c	Eukaryotic cell
Fvd	Flavonoid
F.s.c.c	Fused silica capillary column
I.p	Instrumental parameters
M.m	Metabolism
M _t d	Method
M.e.k.c.c	Micellar electro kinetic
M.C.L	Micelle
NI	Negative ion
Ps	Plant species
PI	Positive Ion
P.c	Prokaryotic cell
Qn	Quinone
S _{pt}	Separation
Tps	Terpenoids
V _{t_g}	Voltage

8.1 Introduction

Metabolism (M.m) is a magical strategy for the formation of various cell function. It is also observed that M.m is created either the beginning of eukaryotic cell (e.c) and prokaryotic cell (p.c) (Harstad et al. 2016). If M.m does not occur, the functions related to natural cellular works of a normal cell would be lost. Energy is required for conducting the formation of the cell. This energy is derived from food, cellular function is switched on when energy is derived from food (Harstad et al. 2017). There are two types of M.m such as catabolism (compound breaking) and anabolism (compound making). The metabolite products (m.ps) of e.c are polysaccharide, carbohydrate, lipid, and nucleic acid which are also known as a primary metabolite (Zhang et al. 2017). Besides, m.ps of p.c (plant, bacteria, fungus, etc.) are alkaloids, glycoside, terpenoids, saponin, etc. However, there are different M_td (spectroscopic technique and chromatographic technique) in regards to know what types of P are created in e.c (Junger et al. 2019). By the application of an electrical field, if a sample contained positive (PI) and negative ion (NI), these PIS are transferred into the negative end and NIS are positive end the phenomenon is called as electrophoresis (Fig. 8.1). There are various M_td in this technique (Fig. 8.2). So, Capillary electrophoresis (c.e) is a new hypothesis separation (S_{pt}) technique (Fig. 8.3). It was first invented by Hertel in 1957.