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# Chromatographic Separation Studies of Cephalosporins on CTAB Modified Silica Layers with Different Buffer Solvent Systems

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**Abstract:** Various surfactant modified silica layers were used for the chromatography of five different Cephalosporins. The 4% methanolic CTAB impregnated silica layer was useful for the chromatography of Cephalosporins. The acidic buffer solvent systems were used with the 4% methanolic CTAB impregnated silica layers for the separation of different mixtures [A (Cefaclor, Ceftriaxone and Cefadroxil), B (Ceftriaxone, Cefoprazone and Cephalexin) and C (Cefaclor, Ceftriaxone and Cephalexin)] of Cephalosporins. The interference due to the presence of sodium and potassium salts, glucose and urea on the identification and mobility of all the five Cephalosporins were also examined.

**Keywords:** Cephalosporins, Thin Layer Chromatography, Surfactants, Buffer solvent systems.

## Introduction

Cephalosporins (fig:1) structurally differ from penicillin's by the heterocyclic ring system. Cephalosporins are penicillinase resistance antibiotics with significant activity against both gram-positive and gram-negative bacteria. They are among the safest and the most effective broad spectrum bactericidal antimicrobial agents, therefore they are the most prescribed of all the available antibiotics<sup>1-2</sup>. Because of the high therapeutic importance of cephalosporins several analytical techniques have been used for their analysis such as, titrimetric<sup>3-4</sup>, High performance liquid chromatography<sup>5</sup>, Voltametric<sup>6</sup>, Spectrophotometry<sup>7-8</sup> Mass-spectrophotometry<sup>9</sup>. The most of these analytical methods required expensive and sophisticated instruments. This report is an attempt in the direction of developing a simple and reliable method for on plate identification and separation of cephalosporins in pharmaceutical formulations. Amongst all chromatographic techniques, thin layer chromatography (TLC) has been the most popular for routine analysis due to its simplicity of use, simultaneous analysis of large number of samples, use of specific and colorful reactions, the possibility of two-dimensional separation and easier manipulation of stationary and mobile phases. The aim of this study was to develop a new chromatographic system by impregnating silica gel with solutions of surfactants.

In this report we have utilized the versatile amphiphilic nature of surfactants in the impregnation of silica layers. It is reported that the preliminary impregnation of the adsorbent with surfactant solutions leads to the change in elution order and their behavior was observed in the impregnation of both normal and reversed stationary phase. The separation of primary aliphatic and aromatic mono- and polyamines<sup>9-11</sup>, amino acids<sup>12</sup> peptides and dipeptides<sup>13-14</sup>. The introduction of surfactant into the stationary phase leads to dynamic modifications in the stationary phase. According to the literature survey, previously Cephalosporins were analyzed by various TLC methods on silica gel layers<sup>15-16</sup> but the use of methanolic surfactant modified stationary phase is lacking.

## Experimental:

### Instrumentation and reagents

A TLC applicator (Toshiwal India) and pH meter Elico India Ltd was used. Chemical required like silica Gel 'H', Sodium dodecyl sulfate (SDS), N-cetyl-N, N, N-trimethylammonium bromide (CTAB), Methanol, were purchased from Merck India, Iodine crystals, Glacial acetic acid, Boric acid, Phosphoric acid and Sodium hydroxide were obtained from CDH India,