Chromatographic Seperations Of Cephalosporins In Pharmaceutical Formulations

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Abstract- *The identification of certain cephalosporins, such as Cephalexin and Cefpodoxime Proxetil, in pharmaceutical preparations is described using a thin layer chromatographic technique (TLC). The 20 x 20 cm silica gel G-coated chromatographic plate has a focusing zone developed in a separate mobile phase with a mesh size of 0.25 cm. An iodine chamber and a UV detector were used to identify the spots. For routine laboratory testing of cephalosporins, this approach might be helpful.*

Keywords- Cefpodoxime Proxetil, Cephalexin, UV detector, Beta lactam, TLC

I. INTRODUCTION

First generation cephalosporin for oral use, Cephalexin [3-Methyl-7D (2 phenylglycinamido)-3 cephem-4 carboxylic acid] is semi-synthetic.It is specifically used to treat urinary tract infections and respiratory infections. Proxetil (RS)-(isopropoxycarbonyloxy)ethyl(+)-(6R.7R)-cefpodoxime2-(2-amino-4-thiazolyl)-7-[2--2-{acetamido} methoxyimino}(Z)}3-methoxymethylOct-2-ene-2-carboxylate {4,2,0} -8-oxo-5-thia-1-azabicyclo is a third-generation, extended-spectrum, semi-synthetic antibiotic that prevents the formation of cell walls. It works against germs that are both gram positive and gram negative. In the presence of beta lactamase enzymes, it is quite stable. Particularly, respiratory and urinary tract infections are treated with it. For oral administration, they are sold commercially as tablets and capsules with 250 and 500 mg contents.

Several TLC techniques for the selective extraction of cephalosporin from pharmaceutical formulations and biological fluids have been identified by a search of the literature. These drug-finding techniques have a lot of unpredictability and require laborious steps. In places with few facilities, a straightforward analytical technique is therefore required for quick drug screening.

In order to separate Cephalexin and Cefpodoxime Proxetil economically and conveniently, the current work was done to employ thin layers of silica gel as an adsorbent.

II. MATERIAL AND METHODS

REAGENT AND SOLVENTS

Analytical reagent grade solvents and reagents were all utilized. Every solution was made with deionized water. Additionally, freshly made solutions were used.

Plating preparation

In a stoppered bottle, slurry is made by shaking distilled water, silica, and calcium sulfate. After that, cleaned slides are moved back and forth, but not touching, in the adsorbent slurry. After allowing the chromatoplate to air dry for ten to fifteen minutes, it is heated in an oven at 1100C for two hours to activate it.

PREPARATION OF STANDRAD SOLUTION

(A) CEPHALEXIN : - A commercial capsule's contents were measured and then diluted using demineralized water. The mixture was agitated and passed through a vacuum filter. Subsequently, the solution was diluted with 100ml of deionized water. This solution's aliquot will provide an analyte concentration of roughly 5 mg/ml.

(B) CEFPODOXIME PROXETIL: - Pulverize the store-bought tablets and mix them with demineralized water at 30 degrees Celsius to create a saturated solution. Activated charcoal was added to the mixture, and it was agitated for fifteen minutes. At a low temperature, the solution was filtered and concentrated. Cefpodoxime Proxetil crystalline crystals were dried and weighed. Transfer 0.05g of the dry crystals to a 10ml volumetric flask and top it off with water. This Cefpodoxime Proxetil stock solution has a 5 mg/ml concentration.

PROCEDURE

With the aid of a capillary tube, 0.02–10 µl of each drug solution were spotted as distinct spots on the TLC plates. The plates were developed at a temperature of 25–30 0C in a

closed glass sintering chamber with developing solutions that had been saturated 30 minutes before. The spot points were not permitted to be submerged, but the solvent in the chamber was permitted to reach the lower edge of the adsorbent. After installing the cover, the system was kept running for a minimum of 10 to 15 minutes, or until the solvent had risen to a point that was 14 to 15 cm above the original areas. Following a run, the plate was taken out of the developing chamber and let to air dry. After that, non-destructive techniques were employed to locate the split locations, including the use of UV light with wavelengths of 254 and 365 nm. Following that, plates are sprayed with detecting reagent for optimal color development. For the medicines that were isolated, the Rf values were noted. Every experiment was conducted at room temperature.

III. RESULTS AND DISCUSSION

The Rf values for Cephalexin and Cefpodoxime Proxetil in different solvents are shown in Tables 1 and 2, together with the colors that evolved at each stage. The medications were sprayed with iodine reagent and seen at a wavelength of 254 nanometers in the UV. Water is the ideal development solvent for the thin layer chromatographic technique of cephalosporins because of their solubility.

Both in the Iodine solution and under UV light, the dots are clearly defined.It has been successfully accomplished to analyze pharmaceutical preparations using this technology. The outcomes have been contrasted with the ones attained through formal means. There was excellent agreement between the suggested method's results and the approved techniques. This method's main benefit is that it allows for the detection of the separated materials without requiring any chemical modification through reaction. The thin layer chromatographic method is a good choice for the analysis of these cephalosporins in light of the findings. This investigation's goal was to provide information on the quick separation and detection of specific cephalosporins utilizing a variety of solvent systems.

TABLE 1: -RF VALUES OF CEPHALEXIN

S.No.	Solvent	Composition (V/V)	Rf value	Colour in Iodine Solution	Colour in UV (254 nm)
01	Water: Ethanol	50:50	0.66	Brown	White Spots with Brownish Background
02	Water: Methanol	50:50	0.63	Brown	-do-
03	N-Propanol: water	70:30	0.64	Pink	White
04	Butanol: Ethanol:Water	35:35:30	0.70	Brown	White Spots with Brownish Background
05	Acetonitrile: Water	5:95	0.73	Brown	-do-

TABLE 2: -RF VALUES OF CEFPODOXIME PROXETIL

S.No.	Solvent	Composition (V/V)	Rf value	Colour in Iodine Solution	Colour in UV (254 nm)
01	Water: Ethanol	50:50	0.64	Brown	White Spots with Brownish Background
02	Water: Methanol	50:50	0.62	Brown	-do-
03	N-Propanol: water	70:30	0.63	Pink	White
04	Butanol: Ethanol:Water	35:35:30	0.69	Brown	White Spots with Brownish Background
05	Acetonitrile: Water	5:95	0.67	Brown	-do-

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