



Analytical Methods for the Quantification of Tenofovir - A Review

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Abstract

Tenofovir disproxil fumarate (Figure 1) is chemically Bis{[(iso propoxy carbonyl) oxy] methyl} {[(2R)-1-(6-amino-9H-purin-9-yl)-2-propanyl] oxy} methyl phosphonate (C₂₃H₃₄N₅O₁₄P) with molecular weight 635.5 gm/mole. Tenofovir disproxil fumarate (CAS Number: 201341-05-1) is a nucleotide analog reverse transcriptase inhibitor (1). It is available with different brand names such as Tenvir, Tavin, Ricovir, Rivofone T etc as tablets (Label claim 300 mg)..

Keywords: Tenofovir Disproxil Fumarate; Spectrophotometry; HPLC; HPTLC; LC-MS

Introduction

Tenofovir disproxil fumarate (Figure 1) is chemically Bis{[(iso propoxy carbonyl) oxy] methyl} {[(2R)-1-(6-amino-9H-purin-9-yl)-2-propanyl] oxy} methyl phosphonate (C₂₃H₃₄N₅O₁₄P) with molecular weight 635.5 gm/mole. Tenofovir disproxil fumarate

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Tenofovir disproxil fumarate was estimated by different analytical techniques such as spectrophotometry [2-10], HPLC [11-16], HPTLC [17,18] and LC-MS [19,20] in pharmaceutical formulations as well as biological fluids. Table 1 represents the details of spectrophotometric methods and Table 2 represents the details of liquid chromatographic methods.

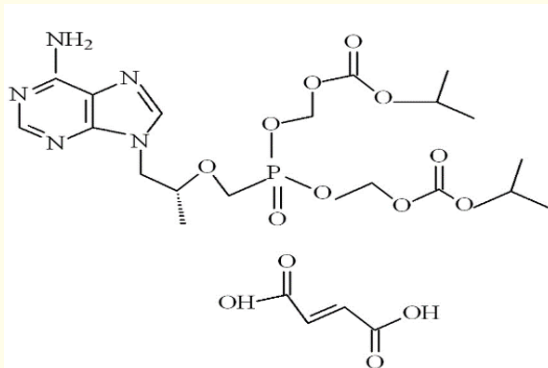


Figure 1: Chemical structure of Tenofovir disproxil fumarate.

Table 1: Spectrophotometric Methods.

Reagent	Linearity ($\mu\text{g/ml}$)	λ_{max} (nm)	Reference
Water	10 - 50	260	2
Triple distilled water	5- 90	261	3
Methanol	5-50	259.5	4
0.1N HCl (D_0 and D_1)	5-40	260	5
Wool fast blue and Buffer (pH 1.5)	50-250	590	6
Tropaeoline -00 dye	50-250	410	
Distilled water (AUC)	1-20	255- 265	7
Forced degradation studies	2-10	260	8
Forced degradation studies	2-10	260	9
Bromothymol blue	1.5–25	410	10
Bromophenol blue	1.0–25	415	
Bromocresol purple	1.25–25		

Table 2: Liquid Chromatographic Methods.

Method	Mobile Phase (v/v)	λ (nm)	Linearity ($\mu\text{g/ml}$)	Reference
HPLC	Methanol: Phosphate buffer (90:10)	260	20-110	11
HPLC	Methanol/Water (60:40)	260	0.004-0.4	12
HPLC	Methanol-Acetonitrile (50:50): Ammonium acetate (pH 4.19) (50:50)	60	10-60	13
HPLC	Buffer: Acetonitrile (60: 40)	260	150.17-450.52	14
HPLC	Methanol: Water (60:40)	260	4-20	15
HPLC	Acetonitrile: Water (75:25)	259	0.2-10 mg	16
HPTLC	Ethyl acetate: Methanol: Formic acid (7:2.5:0.5)	266	0.125-0.750 /spot	17
HPTLC	Chloroform: Methanol (9: 1)	260	0.3–1.5 /spot	18
LC-MS	Water: Acetonitrile (87:13)	-	1-20 0.2-16	19
LC-MS	0.1% aq. Formic acid: 0.1% Formic acid in Acetonitrile	-	0.001-1.0	20

Conclusion

The present review represents the various analytical techniques developed for the estimation of Tenofovir disoproxil fumarate used for the treatment of HIV.

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