NOTE

Spectrophotometric Estimation of Metformin Hydrochloride in Pharmaceutical Dosage Forms

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Two sensitive and reproducible spectrophotometric methods have been developed for the estimation of metformin hydrochloride in pure and its dosage forms by using 0.1 N NaOH (method A) and pH 7.4 phosphate buffer (method B). The maximum absorbance was observed at 233 nm in both the methos. Beer's law was obeyed in the concentration of 1–30 μg/mL in method A and 1–20 μg/mL in method B.

Key Words: Spectrophotometric, Estimation, Metformin hydrochloride.

Metformin hydrochloride is chemically N,N-dimethyl imidodicarban imidic diamide hydrochloride. It is a biguanide hypoglycemic agent in the treatment of non-insulin diabetes mellitus. Metformin hydrochloride was determined by various methods such as differential spectrophotometry[1] at λ_{max} 234 nm based on dissolution in 0.1 N HCl solution, by the use of HPLC with fluorometric detection[2], by atomic absorption spectrophotometry of its copper complex[3], gas-liquid chromatography[4], NMR spectrometry[5] and gas chromatography. Metformin hydrochloride was also determined by conductometric titration using Cu-biguanide reaction (pink solution complex)[7] using sodium tetraphenylborate and cetylpyridinium bromide[8]. In the present investigation the authors have developed two simple, sensitive and reproducible spectrophotometric methods for the estimation of metformin hydrochloride.

An accurately weighed amount of metformin hydrochloride (pure and tablet powder) equivalent to 100 mg was dissolved in 100 mL of water and further dilutions were made with 0.1 N NaOH and pH 7.4 phosphate buffer in method A and method B respectively. A series of standard solutions containing 1.0–30.0 μg/mL of metformin hydrochloride were prepared in 0.1 N NaOH and a series of standard solutions containing 1.0–20.0 μg/mL of metformin hydrochloride were prepared in pH 7.4 phosphate buffer and absorbances were measured at 233 nm against reagent blank. All spectral and absorbance measurements were made on ELICO SL-159 UV-Vis spectrophotometer.

Beer's law was obeyed in the concentration of 1–30 μg/mL in method A and

1–20 μg/mL in method B. The optical characteristics are summarized in Table-1. The values obtained for the determination of metformin hydrochloride in several pharmaceutical formulations (tablets) by the proposed methods are given in Table-2. To evaluate the validity and reproducibility of the two methods, known amounts of pure drug were added to the previously analyzed pharmaceutical preparations and the mixtures were analysed by proposed methods and the per cent recoveries are given in Table-2.

TABLE-1

OPTICAL CHARACTERISTICS AND PRECISION

Parameters	Method A	Method B
Beer's law limits (μg/mL)	1–30	1–20
Molar extinction coefficient (L mole^{-1} cm^{-1})	1.757×10^4	1.687×10^4
Sandell's sensitivity (μg/cm^2/0.001 absorbance unit)	0.0095	0.0099
Regression equation (Y)*		
Slope (b)	0.09253	0.09733
Intercept (a)	0.04761	−0.002404
Correlation Coefficient (r)	0.99744	0.9993

Y* = a + bc, where c is concentration in μg/mL and Y is absorbance unit

TABLE-2

ESTIMATION OF METFORMIN HYDROCHLORIDE IN
PHARMACEUTICAL FORMULATIONS

Sample	Labelled amount (mg)	Amount obtained (mg)		% Recovery by the proposed methods	
		Method A	Method B	Method A	Method B
1.	500	496.5	498	99.60	98.90
2.	500	493.0	491	98.96	98.96
3.	500	491.5	487	99.63	99.60

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