*Asian Journal of Chemistry* Vol. 20, No. 3 (2008), 2470-2472

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# Spectrophotometric Method for Simultaneous Estimation of Paracetamol and Piroxicam in Tablets

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A simple, rapid, accurate and precise spectrophotometric method has been developed for simultaneous estimation of paracetamol and piroxicam from tablet dosage form. Method involves, formation of Q-absorbance equation at 257 nm ($\lambda_{max}$ of paracetamol) and 320 nm (isoabsorptive point) in 0.01 N NaOH. The linearity lies between 4-12 mcg/mL for paracetamol and 4-40 mcg/mL for piroxicam. The results of recovery studies confirm the accuracy of the proposed method.

**Key Words: Spectrophotometry, Q-Absorbance ratio method.**

Chemically, paracetamol is N-(4-hydroxyphenyl)acetamide and piroxicam is 4-hydroxy-2-methyl-N-(pyridin-2yl)-2H-1,2-benzothiazine-3-carboxamide-1,1-dioxide[1].

In literature survey, many spectrophotometric and chromatographic methods have been reported for estimation of paracetamol and piroxicam from pharmaceutical formulations[2-5]. Both these drugs are official in IP, BP and USP[6-8]. No spectrophotometric method is so far reported for simultaneous determination of paracetamol and piroxicam from bulk and formulations. In present communication, we propose simple, accurate and fast, spectrophotometric method for simultaneous estimation of both the drugs in tablets.

A UV-Visible spectrophotometer (Shimadzu-2450) with spectral bandwidth 1 nm was employed for all spectroscopic measurements, using a pair of 10 mm matched quartz cells.

This method is based on solving Q-absorbance equation[9], at two selected wavelengths; one at isoabsorptive point and other being the $\lambda_{max}$ of one of the two components.

**Preparation of standard solutions:** Paracetamol (10 mg) and piroxicam (10 mg) were accurately weighed and transferred to two separate 100 mL volumetric flask; dissolved in 0.01 N NaOH to obtain stock solution of 100 mcg/mL. From the overlain spectra of paracetamol (8 mcg/

mL) and piroxicam (2 mcg/mL), two wavelengths 257 nm ($\lambda_{max}$ of paracetamol) and 320 nm (isoabsorptive point) were selected for the formation of Q-absorbance equation. Different aliquots were taken from the stock solutions and diluted with the same solvent to prepare a series of concentrations. The calibration curves were found to be linear in the concentration range of 4-12 mcg/mL with correlation coefficient ($r^2 = 0.9998$) for paracetamol and 4-40 mcg/mL ($r^2 = 0.9992$) for piroxicam (Table-1). The absorbances of paracetamol and piroxicam were measured at 257 and 320 nm, respectively. The concentration of two drugs in the mixture can be calculated by using equations

$$C_{Paracetamol} = Q_0 - Q_1/Q_2 - Q_1 \times A_2/a_2 \quad (1)$$

$$C_{Piroxicam} = Q_0 - Q_2/Q_1 - Q_2 \times A_2/a_1 \quad (2)$$

where, $Q_0$ = absorbance of sample at 257nm/absorbance of sample at 320 nm; $Q_1$ = absorptivity of piroxicam at 257 nm (382.6)/absorptivity of piroxicam at 320 nm ($a_1 = 224$); $Q_2$ = absorptivity of paracetamol at 257 nm (719.7)/absorptivity of paracetamol at 320 nm ($a_2 = 19.6$); $A_1$ and $A_2$ is absorbance of sample at 257 and 320 nm, respectively.

TABLE-1
TABLET FORMULATION ANALYSIS DATA

| Label claim (mg/tab) | | Label claim* ± SD (%) | | Recovery* ± SD (%) | |
|---|---|---|---|---|---|
| PCM | PIX | PCM | PIX | PCM | PIX |
| 325 | 20 | 99.09 ± 0.93 | 99.29 ± 0.52 | 99.73 ± 0.95 | 99.85 ± 0.30 |

*Mean of six estimations; PCM = Paracetamol; PIX = Piroxicam

**Application of the method for the commercial formulation:** 20 Tablets were weighed and ground to a fine powder. A quantity equivalent to 100 mg of paracetamol was accurately weighed and transferred to a 100 mL volumetric flask; 50mL of 0.01 N NaOH was added and sonicated for 10 min. The solution was filtered through Whatmann filter paper no. 41 and the volume was made up to 100 mL, using same solvent. From it, 200 µL solution was transferred using micropipette to 25 mL of volumetric flask; to it, 1.5 mcg/mL of standard piroxicam was added (to obtain 4:1 ratio of paracetamol and piroxicam) and volume was made up to mark. Absorbances of these solutions were measured at 257 and 320 nm as $A_1$ and $A_2$, respectively. And, the concentrations of these two drugs in the sample were calculated using eqns. 1 and 2.

**Recovery studies:** The recovery studies were carried out by adding known amount of standard solution of paracetamol and piroxicam to preanalyzed tablet solutions. The resulting solutions were then analyzed

by proposed methods. The results of recovery studies were found to be satisfactory and the results are presented in Table-1.

The proposed method for simultaneous estimation of paracetamol and piroxicam in combined dosage form was found to be simple, precise, rapid and economical for routine analysis. The accuracy of the method was determined by calculating mean percentage recovery. Precision was calculated as inter and intra-day variation and % RSD values lying in the range of 0.021-0.072 for paracetamol and 0.016-0.049 for piroxicam, respectively. Ruggedness of proposed method was determined with the help of two different analysts and % RSD was lying in the range 0.026-0.053 for paracetamol and 0.062-0.075 for piroxicam, respectively.

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(*Received*: 19 March 2007; *Accepted*: 17 December 2007) AJC-6133