RESEARCH ARTICLE

Spectrophotometric Techniques for the Determination of Sitagliptin Phosphate Drugs in Bulk and few Pharmaceutical Products by using MBTH and Ferric Chloride

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ABSTRACT

The current study aimed to evolve a method for the detection of sitagliptin (STG) concentration. The method was built on the estimation of absorbance STG wave 612 nm concentration range was (1–18 ppm) and was reacted for oxidative coupling of pregabalin with 3-methyl-2-benzthiazolinone hydrazone (MBTH) to form green in color. The captured product was analyzed statistically by using (f and t-test). The current manners were profitably applied to the investigation of the pharmaceutical establishment. It is evicting that the modern manner is responsive and meticulous for terming of STG a different pharmaceutical formation.

Keywords: MBTH, Sitagliptin, Phosphate, Ferric Chloride.

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INTRODUCTION

Sitagliptin (STG) is [(2R)-1-(2, 4, 5-trifluorophenyl)-4-oxo-4-[3-(trifluoromethyl) -5,6dihydro [1, 2,4] diazole [4,3-a] pyrazin -7(8H)-yl] butan-two-amine], (Figure 1).[1] It is verbally effective and electric discouraged of dipeptide peptidase-IV that is applied to treat two diabetes.[2] Among the well-known trade names of the drug is Januvia[3] was prepared in 2006 in the United States by Merck. This drug is preferred to be[4] used with proper diet and playing sport, as well as used with other medications to control high blood sugar.[5] It was used diabetics from The second type. High blood sugar helps prevent damage, blindness, and sexual function problems. Proper control of people with diabetes may also reduce the heart risk attack or stroke.[6] STG is a diabetes medication that works by increasing the levels of natural substances called[7] (incretions) and incretion helps control of blood sugar by increasing[8] insulin secretion, especially after eating. They help reduce the magnitude from sugar the liver makes.[9] Figure 1 Shows the synthetic formula of STG phosphate.[10]

A survey of the literature discloses several analytical manner for the qualitative measurement of STG, in other formulations.[11] In frequent analysis laboratories looking for simultaneous detection[12] in drug analysis, the present research has been guaranteed to advance definite, simple spectrophotometry procedure for qualitative choice,[13] net positioning of the same.[14] In the study, we built a fangled, simple mode for determining STG.

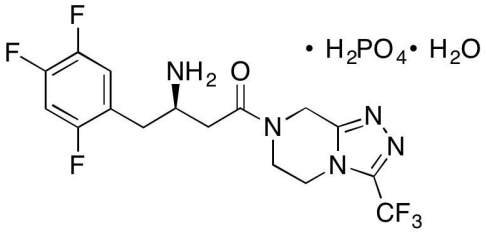

Figure 1: STG phosphate

Chemicals and used devices:

- pH measuring device WTW (Germany)
- Water bath (Germany).
- Electronic scale
- Ultrasonic cleaner (china).
- UV/visible spectrophotometer with double beam mode 1800 (SHimadzu-1800).
- Solvent

Solvent:

The solvent consists of the following components (45 mL of 0.025 m NaH_2PO_4+ 35 mLNH_4OH+ 20 mL CH_3CN).

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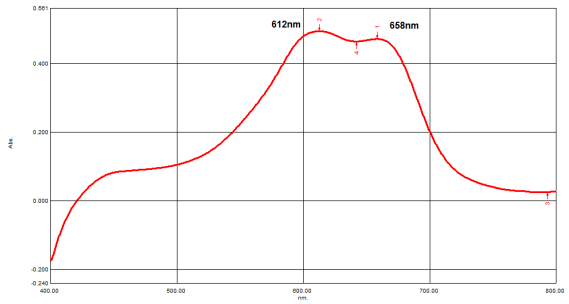

Figure 2: Spectrum of STG (50 µg/mL STG), methanol, acetyl nitrile, Na H_2 PO_4

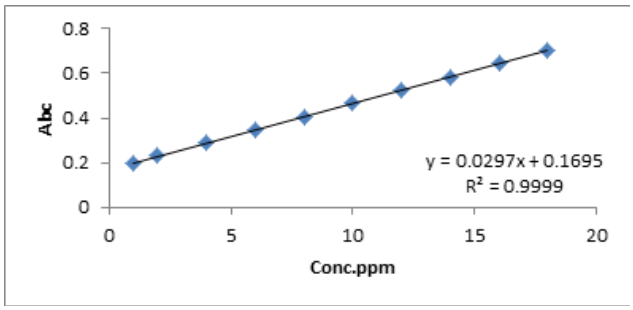

Figure 3: Calibration Graph for STG

The following components were placed in a volumetric flask with a capacity of 100 mL, according to the above mentioned proportions.

- STG phosphate standard was kindly donated by pioneer lraq sulmanya its purity was found to be 98.87%.

To prepare 0.025 M from Na_2HPO_4 we dissolve 0.750 g. in 250 mL of distilled water

- STG: To prepare 100 ppm by dissolving 0.0100 g in DW.
- $FeCl_3$. To prepare 0.01 by dissolving 1 g in 100 mL of 1M HCl than complete to mark with DW.
- MBTH (15) 0.02% w/v 0.200 dissolved in 100 mL DW

Standard Stock Solution

To prepare a standard solution with a concentration of 1000 ppm, the process was carried out by dissolving 0.100 g of STG drug in a 100 mL volumetric flask using the buffer solution consisting a mixture of pH 6.3 sodium hydrogen phosphate, methanol and acetonitrile and with the volume ratio of (45:20:35 v/v/v) and 3 MBTH additional $FeCl_3$ as regent and using an ultrasound water bath, then completing the volume to the mark with the same prepared solvent.

RESULT AND DISCUSSION

The Absorption Spectrum of STG Compound

The purposed manner is based on the reduction of Fe^{+3} to Fe^{+2} by STG phosphate in presene of dilute HCC. Subsequently, these ions reacted with MBTH to produce green colored complex. The spectrum of the compound was scanned versus a reagent blank in the purview (400–800 nm) and showed that she has in particular, λ_{max} at (612 nm) was observed as shown in Figure 2.

Table 1: Shows statistical parameters of the suggest manner for STG

Parameters	*Values*
wavelength	612 nm
scope of linearity[19]	(1–18) µg /mL
Molar absorptivity[20]	3.14×10^3 L.mol^{-1}.cm.$^{-1}$
Sandal functional[21]	0.216 µg.
Extraction factor[22]	(99.1–100.01)%
Correlation of coefficient [23]	0.9999
LoD	0.02 µg /mL
LoQ	0.064 µg /mL
%RSD[24]	0.025

And MBTH with ferric chloride

Calibration curve of complex

The calibration curve, was limiting quadrate to generalizing mode adjudging optimal case, a linear relatingship was acquiring between absorption and concentration the Figure 3 display that STG is undergone Beer lambert law, in the concentration occurrence (1–18 ppm) the molar absorptivity 3.14×10^3 L.mol^{-1}.cm.$^{-1}$

And the sandal functional (0.216 µg.). Emphasizing that the cradle was delicate and sensitive, we also measured the (LoD, LoQ) detection limit as shown in Table 1.

$$E\ \% = \frac{0-T}{T} \times 100\ [16] \quad \text{.....(1)}$$

$$SD = \sqrt{\frac{\sum(xi-x)^2}{n-1}}\ [17] \quad \text{.....(2)}$$

SD: Standard deration

$$R\ SD\% = \frac{SD}{x} \times 100\ [18] \quad \text{.....(3)}$$

Precision and Accuracy

Accuracy pointing to the difference between the true value and the measured values precision refers to the repeatability, that is, how often the measurements are repeated and as expressed in relative error E% recovery rate%. Measurements are related to each other and expressed in terms of the standard deviation (SD) Percentage, RSD%. The accuracy and precision in this research were calculated by calculating the relative error. The recovery ratio and the relative standard deviation, where the calculations were made using equation (1–3). The process is by taking three different known standard concentrations of STG in the best conditions (Table 2).

Procedure for Pharmaceutical Preparations

Ten tablets of each sample were accurately weighed, then crushed and mixed well using a ceramic mortar, and a weight equivalent to 0.1000 g of the active substance was taken. The weight taken was dissolved in the previously prepared solvent and in a beaker of 50 mL volume. A quarter of an hour, the mixture was filtered by means of filter paper, the size of 45 μm, then the filtrate its been transferred to a volumetric flask with a capacity of 100 mL, and the volume was fullest to the claim with the same solvent previously prepared to obtain a

Table 2: Precision and accuracy of the suggestive manner of determining STG

Concentration ppm		*Error %*	*%Recovery*	*%RSD*
Taken	*Found*			
6	6.004	0.001	100.0	0.018
12	12.21	0.998-	101.75	0.025
18	17.96	- 0.002	99.77	0.014

Table 3: As a result of suggested manner to some pharmaceutical preparations for STG

Company	*Concentration ppm*		*Error %*	*% Recovery*	*% RSD*
	Taken	*Found*			
Pioneer 100 mg	6	6.012	0.002	102.03	0.048
	12	11.98	-0.001	9983	0. 06
	18	18.001	0.07	10166	0.026
MSD 100 mg	6	6.021	0.003	100.35	0.061
	12	12.03	1.002	100.25	0.048
	18	17.99	0.055	99.94	0.037

concentration of 1000 g/mL, after which it was diluted to obtain the working concentrating.

Analytic Application

The suggested manner was effective applied in spectral analysis STG in a few pharmaceutical preparations plenteous in the domestic marketplace and from different infinitive as displayed in Table 3. Three solutions of one concentration and three different solutions of each medicinal product were prepared. The accuracy and precision of the methods for estimating the studied drugs in these mutants were calculated. The results in Table 3 are the possibility of applying the suggested analytical manners in evaluating these drugs.

CONCLUSION

STG of MBTH has successfully used a soluble chromatic complex with iron through a spectrophotometric technique developed to determine STG in its pure state and in some pharmaceutical preparations. Based on the use of a solvent capable of dissolving the drug compound. In addition to the previously mentioned reagents and by calculating the RSD% and the recovery rate of the used methods, we can conclude that this method is of high accuracy and therefore can be applied in the determination of these drugs in their pure state and in their pharmaceutical preparations The suggest method has excellent medicines accuracy with a short analysis time equivalent to four minutes. Accordingly, we conclude that the method is accurate and economical with low detection limit and quantitative limit.

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