



Area under Curve by UV Spectrophotometric Method For Determination Carbimazole in Bulk

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ABSTRACT

The goal of this study is to find a spectrophotometric way to measure carbimazole in active pharmaceutical ingredients that is easy, accurate, and quick. The goal of this study is to figure out how much carbimazole there is by using an area under the curve (AUC) method with UV Visible Spectrophotometry. The goal of the study is to make sure that the established methods meet ICH standards. The range of 200 to 400-nm wavelengths was chosen for this. In this study, alcohol and acetone were used as solvents (50mL acetone for stock solution and serial dilution in 25 mL distilled water). The method was found to be linear ($r^2 = 0.992$) for concentrations between 2 and 10 g/ml. The method that was made was found to be simple, straight-forward, accurate, and sensitive.

Keywords: Carbimazole, linearity, AUC, spectrophotometer, alcohol, and Acetone

Received 25.11.2021

Revised 08.01.2022

Accepted 21.01.2022

INTRODUCTION:

Carbimazole derivatives are antithyroid medicines that are structurally linked to carbimazole and are useful against a variety of disorders. (Propylthiouracil)-Carbimazole is another name for it. Carbimazole raises the chance of therapy failure pharmacologically. Carbimazole's main mechanism of action is that it has a decreased rate of reemission, which reduces the impact of long-term antithyroid medications. [1] Carbimazole is a drug that inhibits thyroid peroxidase and reduces inorganic iodine uptake by the thyroid. It also reduces the formation of di-iodotyrosine and thyroxine incorporation, which causes cysts in the head and neck. Carbimazole is nearly water insoluble and only slightly soluble in Acetone. As a result, Carbimazole is tested in a mixture of water and alcohol. The goal of this study is to create a simple, precise, and accurate Spectrophotometric method for determining carbimazole in bulk. [2]

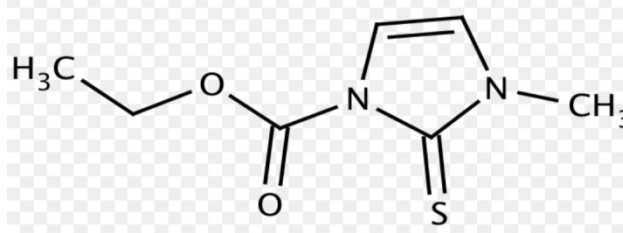


Fig no 1 structure of Carbimazole

MATERIAL AND METHODS

Chemicals:

Carbimazole was obtained at collage sample of Vishal institute pharmaceuticals education and research ale, pune. alcohol, and acetone was used as solvent throughout the experimentation.

Instrumentation:

A Shimadzu (Kyoto, Japan) model UV- 1800 double beam UV- Visible spectrophotometer attached with computer operated by software with UV probe 2.33. Spectral width of 2 nm, wavelength accuracy of 0.5 nm and pair of 1 cm matched quartz cells was used to measure absorbance of the resulting solutions. Digital Analytical balance, Mettler Toledo (Model JL 1503-C) was used for weighing purpose.

Experimental Work:

A) To determine Carbimazole's solubility, 5 mg of Carbimazole was dissolved in 5 mL of a solvent such as alcohol or acetone for qualitative solubility assays. [3]

B) To determine Carbimazole's maximum concentration:

Weigh 10 mg of the pure medication (Carbimazole) and dissolve it in a tiny amount of alcohol, then add acetone to get the volume up to 100 ml for a standard stock solution of 100 mg/ml. To achieve a clear solution, sonicate this solution for 5 minutes. Take 0.5, 1, 1.5, 2, 2.5 ml of the aforementioned solution and dilute with distilled water to make standard solutions with concentrations of 2,4,6,8, and 10 m/ml. (4), (5) Figure 2 depicts the spectrum peak information.

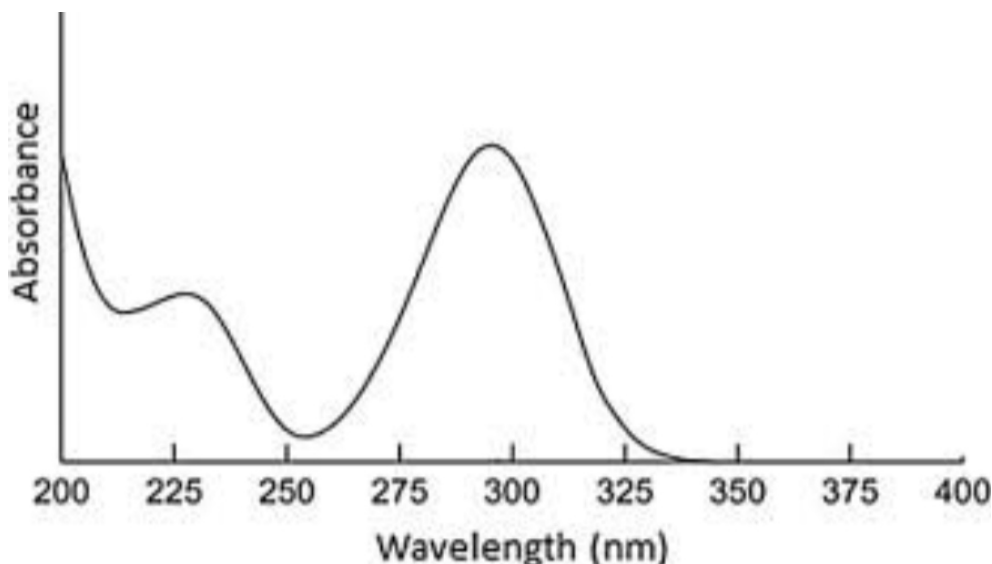


Fig no 2: λ_{max} of Carbimazole, Spectrum peak pick.

C) Analytical Method Development and Validation:**Linearity / calibration curve:**

The interval between the upper and lower concentrations of Analyte in the sample is the linearity of an analytical process. As a result, it was proved that the analytical technique is linear. Carbimazole (2, 4, 6, 8, and 10 m/ml) standard solution (0.5, 1, 1.5, 2, and 2.5 ml) was pipette out in a separate series of 25 ml volumetric flasks. Make up the difference in volume with a well-mixed mixture of alcohol and acetone. The absorbance maxima and area under curve for the solutions were measured against distilled water as a blank at 471nm and range of nm using two procedures, respectively. Table 1 shows the Carbimazole Calibration Curve table. Carbimazole calibration curve. [6]

Table no 1 Calibration curve of Carbimazole.

Conc. $\mu\text{g/ml}$	Absorbance
2	0.993
4	0.996
6	0.998
8	0.999
10	0.999

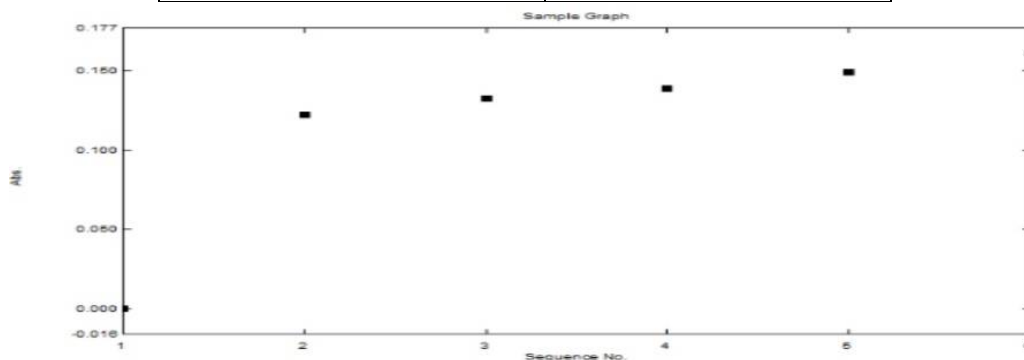


Fig No 3: linearity of Carbimazole

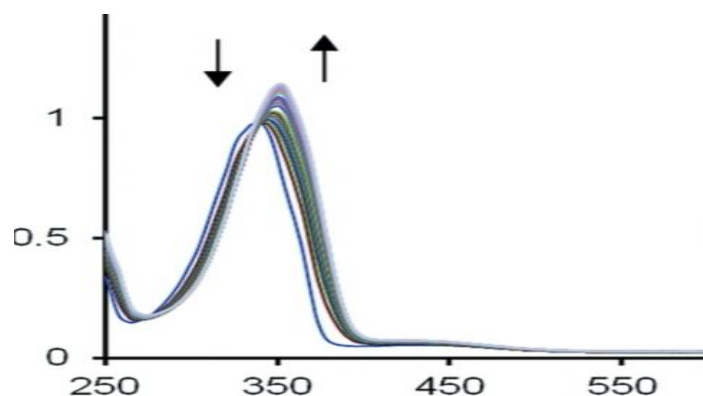


Fig no :4 overlay spectrum of Carbimazole 2 to 10 µg/ml solution.

D) Area Under Curve Approach: When there is a sharp peak or broad spectrum, the AUC (Area Under Curve) method is used. It entails calculating the integrated value of absorbance with respect to wavelength between the two wavelengths 1 and 2 that have been chosen. The area confined by the curve and the horizontal axis is calculated by the area calculation processing item. By placing the wavelength ranges across which area must be estimated on the horizontal axis, the horizontal axis is selected. This wavelength range was chosen based on repeated observations to ensure that the area under the curve and concentration are linear. AUC was calculated using the above-mentioned spectrums. By plotting concentration vs AUC, the calibration curve can be created. [7]

RESULTS AND DISCUSSION:

Carbimazole's AUC (Area under Curve) spectra were taken at a wavelength of 471nm.

A] Drug Calibration Curve:

Method of absorption maxima:

In alcohol + acetone, the absorbance maxima of carbimazole were determined to be 471 nm. The graph generated for the absorbance maxima for pure drug under the experimental circumstances indicated revealed a linear relationship (Figure 5). The slope, intercept, and correlation coefficient values were all subjected to regression analysis. The calibration curve's regression equations were $y = 0.004x + \text{intercept}$ $R^2 = 0.992$ at 471 nm for absorption maxima, with a range of 2 to 10m/ml determined by UV Spectrophotometric study. Table1 shows the calibration curve. Figure 4. depicts the Carbimazole calibration curve.

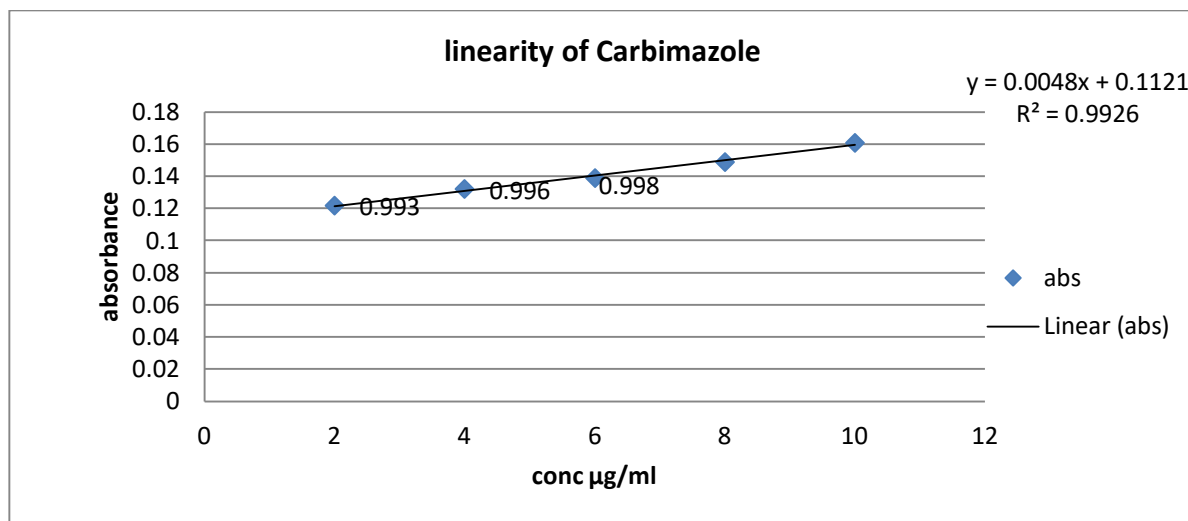


Fig No 5: Calibration curve of Carbimazole

B] Area Under Curve Method :

The graph of the Area Under Curve (AUC) spectra produced under the stated experimental conditions demonstrates a linear connection (Figure 6). The slope, intercept, and R2 values were used in a regression analysis. For Area Under Curve Spectrophotometry analysis, the equation is $Y = 0.004x +$

intercept 0.112 $R^2 = 0.992$ at 471 nm in the range 200–400 nm. The Area Under Curve UV Spectrophotometric study revealed a range of 2 to 10m/ml.

Table 2: Area Under curve of Carbimazole:

Parameter	AUC
Range of wavelength (nm)	200 – 400
Concentration Range ($\mu\text{m}/\text{ml}$)	2 -10
Slope (m)	0.004
Intercept (c)	0.112
Correlation Coefficient (r^2)	0.992

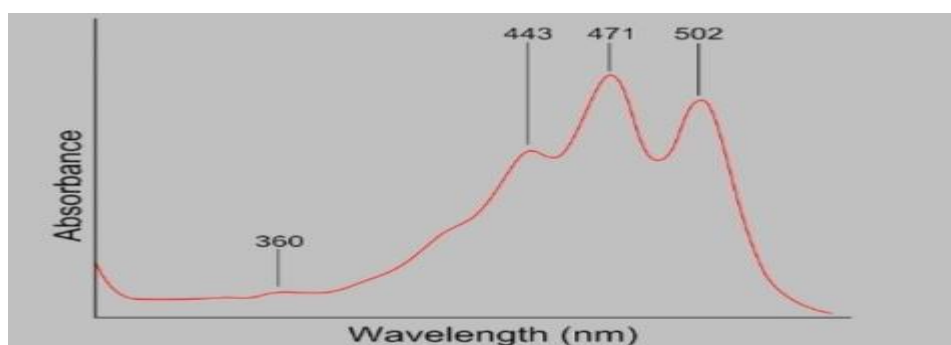


Fig no 6: Area Under Curve of Carbimazole

CONCLUSION

No Spectrophotometric methods for Carbimazole AUC measurement have been described. As a result, UV spectrophotometrically created a simple, fast, and exact area under curve method for the routine determination of carbimazole. The created Method can be summarized as simple, accurate, sensitive, and precise, and it can be used in pharmaceutical formulations with ease.

ACKNOWLEDGEMENT

Vishal Institute of Pharmaceutical Education and Research, Ale, Pune, provided the writers with constant inspiration as well as a Carbimazole reference medication sample. We would like to express our gratitude to our principal, Dr. Jadhav S. L., for providing us with a decent working environment.

REFERENCES

1. <https://www.drugbank.ca/drugs/DB00518>
2. <https://pubchem.ncbi.nlm.nih.gov/compound/Carbimazole>
3. Kala, S., & Juyal, D. (2016). Preformulation and characterization studies of aceclofenac active ingredient. *The Pharma Innovation*, 5(9, Part B), 110.
4. Davidson, A. G., Beckett, A. H., & Stenlake, J. B. (1997). *Practical Pharmaceutical Chemistry*. 2: 275-295.
5. Sharma, M., Koty, A., & Rajab, A. J. A. (2017). A simple and effective method for determination of the antithyroid drug carbimazole using ruthenium trichloride. *Turkish Journal of Chemistry*, 41(6), 995-1012.
6. Christian G D. *Analytical chemistry* 6th edition, John Wiley and Sons, PA, 1-2,604-620, 2003.
7. Blessy, M. R. D. P., Patel, R. D., Prajapati, P. N., & Agrawal, Y. K. (2014). Development of forced degradation and stability indicating studies of drugs—A review. *Journal of pharmaceutical analysis*, 4(3), 159-165.

CITATION OF THIS ARTICLE

Sachin kadam, Shelke Snehal, Kurkute Aishwarya, Suresh Jadhav, Dushyant Gaikwad. Area Under Curve By UV Spectrophotometric Method For Determination Carbimazole In Bulk. *Bull. Env. Pharmacol. Life Sci.*, Vol 11[3] Feb 2022 : 98-101.