Research Article on Determination and Scanning of Capsaicin By using UV Spectroscopy.

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Abstract-
The aim of the present study was to develop a suitable, reproducible and economical spectrophotometric method for analysis of Capaisin. UV-vis Spectroscopy method obeys Beer's law. The Standard curve of Capsaicin was prepared in PBS: Methanol. The calibration curve was found to be linear (R2>0.99) with optimum value of ordinary error for the complete analytical medium used. The regression line of capsaicin showed the accuracy of the method. The maximum absorbance was found in the media of PBS: M for Capsaicin at wavelength 279.5. The calibration curve was to be linear for Capsaicin as R^2 =0.9994 in PBS: M (70:30%V/v).

Key words- Capsaicin, PBS, Methanol and UV Spectroscopy.

Introduction

It is an alkaloid extracted, as a main ingredient from Chilli pepper, is a pungent, lipid soluble compound. It belongs to the family of Capsicum. Capsaicin is that the active principle found in various capsicum fruits like Capsicum annuum (Solanaceae) and Capsicum frutescens. Chemically, capsaicin is trans-8-methyl-N-vanillyl-6-nonenamide (Figure 1). Therapeutic potential of topically applied Capsaicin is attributed to the treatment of pain related disorders like post herpetic neuralgia, diabetic neuropathy, osteoarthritis and rheumatoid arthritis. Capsaicin is a smaller amount employed due to its adverse effects as stinging, burning, and erythema at the appliance site. It exits the desensitization of nociceptors by depleting the neuro transmitter Substance P & other sensory neuropeptides.[1, 2,3,4,5]

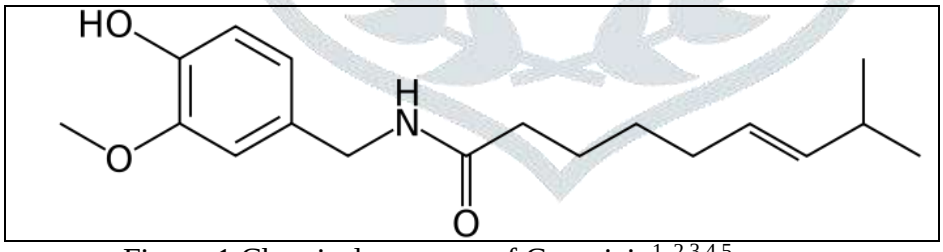

Fig no-1 Chemical structure of Capsaicin[1, 2,3,4,5]

Chemical name- trans-8-methyl N –vanillin-6-noneamide.

Material and method

Capsaicin powder, Methanol, and distilled water.

Method development and optimization

We performed this spectroscopic study on 1601 series model UV-Visible Double Beam Spectrophotometer by Shimadzu, Japan. A 1 cm quartz cuvette was used for obtaining absorption spectra and absorbances of capsaicin in different solution.

Analytical method for Capsaicin

UV absorption spectra Analysis of Capsaicin in methanol solution and Phosphate buffer solution: methanol pH-7.5 (70:30) within the range of 200-400nm.

Preparation of Stock solution and test solution:

A standard stock solution was prepared by dissolving 10 mg of drug in a 10mL of PBS: M (70: 30 v/v) solution. From the stock solution, taken 1 mL and diluted with a 10 mL of PBS: M solution (concentration of the solution was 100 ug /mL). Further, pipette out the 1 mL from the above solution and diluted into PBS: M solution (concentration was 10 ug/mL). The resulting solution was scanned spectrophotometrically between 200 nm to 400 nm. The λ_{max} of the solution was found at 280 nm. The experiment was performed in triplicate, and averages were calculated, and calibration curves were plotted.

Validation

Validation of a developed method was done through determining linearity and linearity-range, accuracy and preciseness according to the Pharmacopoeia.

Linearity and Range

The absorbances of 1 to 10 µg/mL solutions of drug in Phosphate buffer solution was observed on UV spectrophotometer at λmax. Absorbance for each concentration was observed three times, and averages were calculated. Calibration curves for different ranges of concentrations were plotted. All readings above 1 absorbance were excluded. Regression equations and regression coefficients were determined to study linearity.

Result and Discussion

Method Development and Optimization

The λmax for Capsaicin in Phosphate buffer solution pH-7.5 was found -279.5 nm (by UV Spectroscopy). Data for calibration curves are given in Table 1. Standard deviations for slope, intercept and regression coefficient were calculated using three individual calibration curves. The calibration curve of average absorbance for each concentration was set as optimized standard curve.

Validation of Developed Method

Validation of the developed method was done by performing procedures given under the materials and methods. Linearity Studies Equation of linear regression for the developed method came out as

$$y = 0.0111x + 0.001$$

$$R^2 = 0.9994$$

FIG no-2 UV spectrum of capsaicin. The maximum absorbance corresponds to λmax = 279.5nm

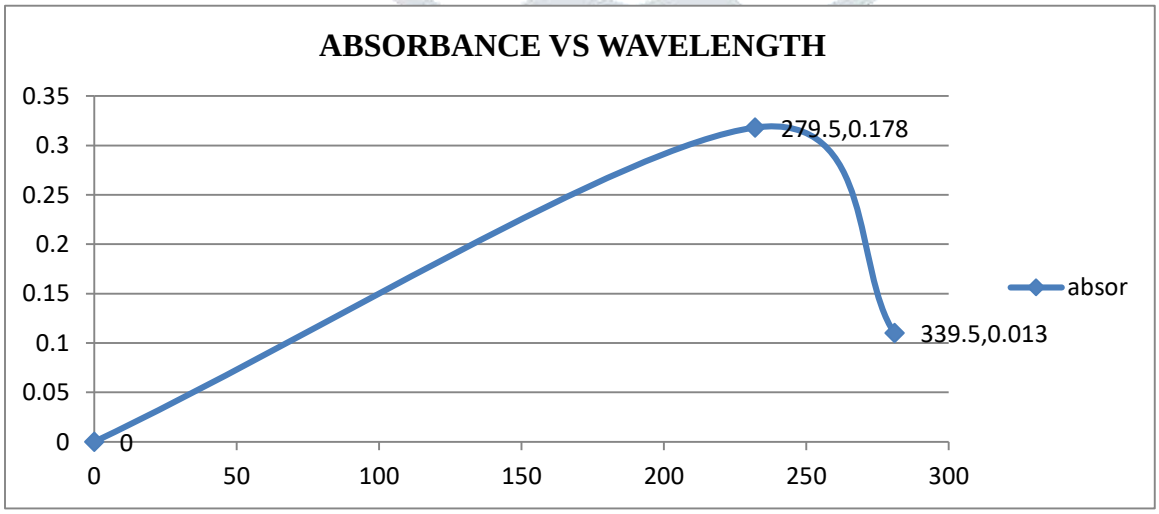

Table 1: Absorbance values and statistical data of the calibration curve

SNO	Concentration(ug/ml)	Absorbance1	Absorbance1	Absorbance1	Mean	Std deviation
1	0	0	0	0	0	0
2	2	0.024	0.026	0.024	0.024666667	0.000942
3	4	0.047	0.045	0.046	0.046	0.000816
4	6	0.069	0.065	0.067	0.067	0.001632
5	8	0.091	0.09	0.09	0.090333333	0.000471
6	10	0.11	0.111	0.11	0.110333333	0.0004714

Table 2: Linearity Parameters

Parameters	Values
Λmax	279.5nm
Linearity range (µg/mL)	1–10µg /mL
Regression equation	y=0.0111x + 0.001
Regression coefficient	0.9994
Slope	0.0111
Intercept	+0.001

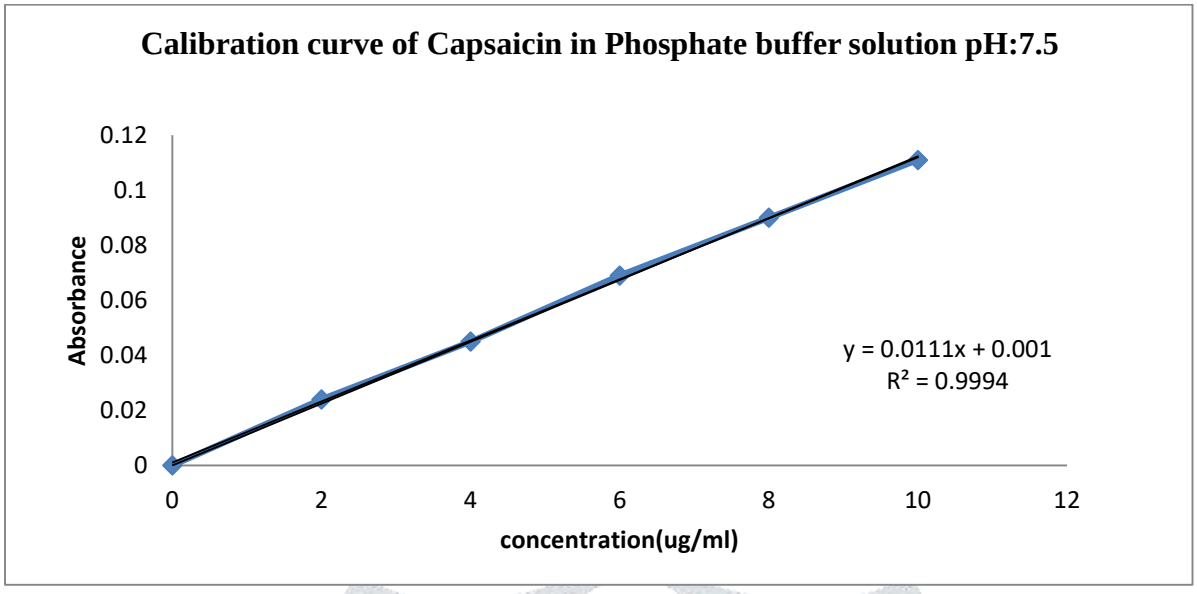

Fig. 3: Standard calibration curve of Capsaicin in Phosphate buffer solution pH:7.5

Conclusion

This investigation showed that, analysis of capsaicin would be done by UV spectrophotometric method. The functional equation and the extinction coefficient values derived from the calibration curve of reference standard of the pure drugs will enable the analyst to determine the drug content in pharmaceutical dosage forms. The UV spectrophotometric method will certainly offer distinct advantage of simplicity, accuracy and sensitivity in analyzing complex structure of capsaicin. The standard curve of capsaicin in different solution showed linearity which concluded that it is possible to determine the content of this drug by Ultraviolet spectroscopic method.

Reference

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