SPECTROPHOTOMETRIC DETERMINATION OF ORGANIC SAMPLES

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Abstract: The UV-Visible spectrometry is one of the instrumental techniques of analysis and is ideal method for determination of quantities in a sample. In UV-VIS spectrometry different samples like organic, inorganic and bio-chemical substances are analysed. These determinations find applications in research industry, clinical laboratories and in chemical analysis of Environmental samples. To obtain UV-VIS spectrum the sample is irradiated with UV radiation varied over a range of wavelength. A monochromatic radiation of a single wavelength is used on the sample. The amount of radiation absorbed at each wavelength is measured and plotted against wavelength to obtain the spectrum. The determinations are found out on different organic samples like Aspirin, Azacitidine, Levocitrizine and Modafinil. After obtaining the spectrum from the sample placed in spectrometer the immediate data of the sample is collected using UV-Probe software which is in compatibility with spectrometer hardware installed in the PC. The data obtained is subjected to mathematical, statistical analysis in Lab-View platform.

Keywords: UV-Visible spectrum, monochromatic radiation, UV-Probe software, Lab-View.

I.INTRODUCTION

UV-Visible spectrometry refers with absorption spectrometry in the UV and visible region. It uses light in the visible and adjacent (near UV and near IR) ranges. The absorption or reflectance in the visible range directly affects the colour of chemicals involved. The absorption of radiation in the UV-VIS region of the spectrum is dependent on the electronic structure of the absorbing species like atoms, molecules, ions or complexes.To obtain a UV-Visible spectrum the sample is ideally exposed with the electromagnetic radiation varied over a range of wavelength. A monochromatic radiation (a radiation of a single wavelength) is employed at a time. This process is called scanning. The amount of the radiation absorbed at each wavelength is measured and plotted against the wavelength to obtain the spectrum. Thus, a typical UV spectrum is plotted for wavelength or frequency versus the intensity of absorption.

Electromagnetic Spectrum Range:

- Range of Ultraviolet Region is 10nm – 380 nm
- Range of Visible Region is 380nm – 780 nm
- Wave length is absorbed in Ultraviolet(deuterium lamp) and Visible Region(tungsten filament lamp)

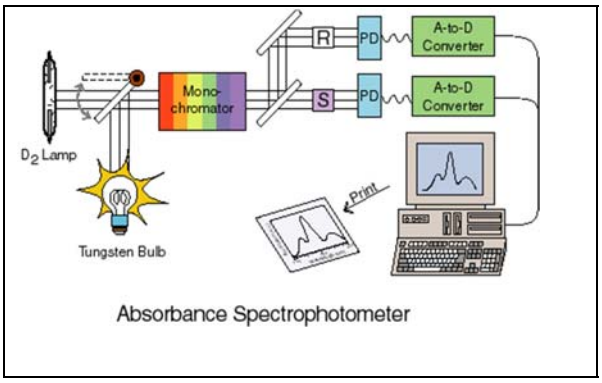


Figure 1.1 Absorbance Spectrophotometer

The sample drugs used in this paper for Spectral analyses are Aspirin, Azacitidine, Modafinil, Levocetrizine. The software used for spectrometer analysis is UV-Probe.

II. Principle of UV-VIS Spectrometry

When a monochromatic light is made to fall on the sample, a part of the radiation is reflected, a part of it is absorbed and other part is transmitted. The intensity of the transmitted light is measured and is found to depend on the thickness of the absorbing medium and concentration besides the intensity of incident radiation. These dependencies of spectrometric determinations are explained using “Beer Lambert’s Law”.

Beer’s Law: It states that absorption of light is directly proportional to both the concentration of absorbing medium and thickness of the medium in the light path.

Lambert’s Law: The amount of monochromatic light absorbed by a substance is proportional to the intensity of incident light. (i.e., the ratio of the intensity of transmitted and incident light is constant.)

III. Methodology

The samples are filled in sample holders and are subjected to incidence of UV-Visible radiation and the process is recorded through UV-Probe software installed in the computer which is interfaced to spectrophotometer. The raw data of samples are obtained and are modified to our requirement. Initially absorbance values for particular sample are obtained and are pasted in Excel sheet.

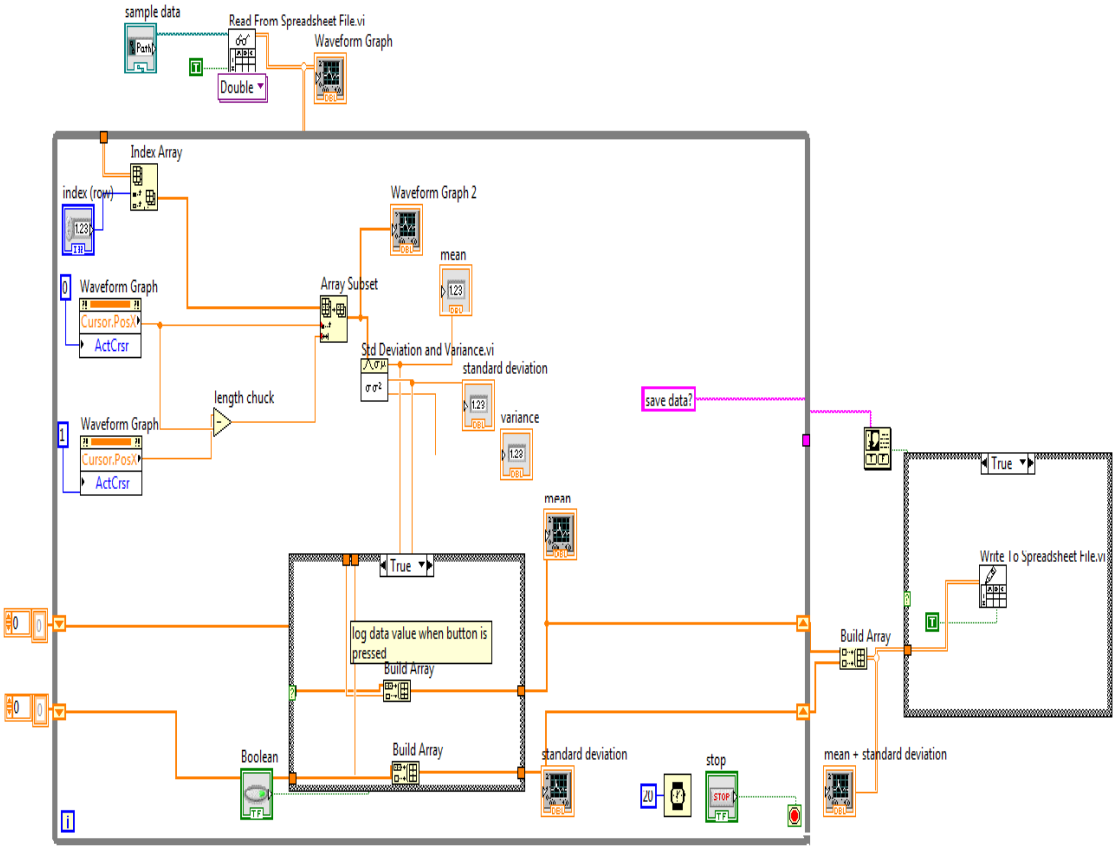
The LabVIEW software contains front panel and block diagram windows. Front panel contains controls and indicators whereas block diagram consists of all functions needed to build a program for execution. File I/O functions are included to acquire input data and finally to present the output. Array functions, graph indicators, timers, case structures and while loop are used for construction of the required program. The input is taken from the Read From Spreadsheet File and further operations are carried out for given Sample to display the mean and standard deviation graphically.

In this way the mean and other properties of any given Sample can be analyzed graphically. The impurity concentration present in any sample can be analyzed.

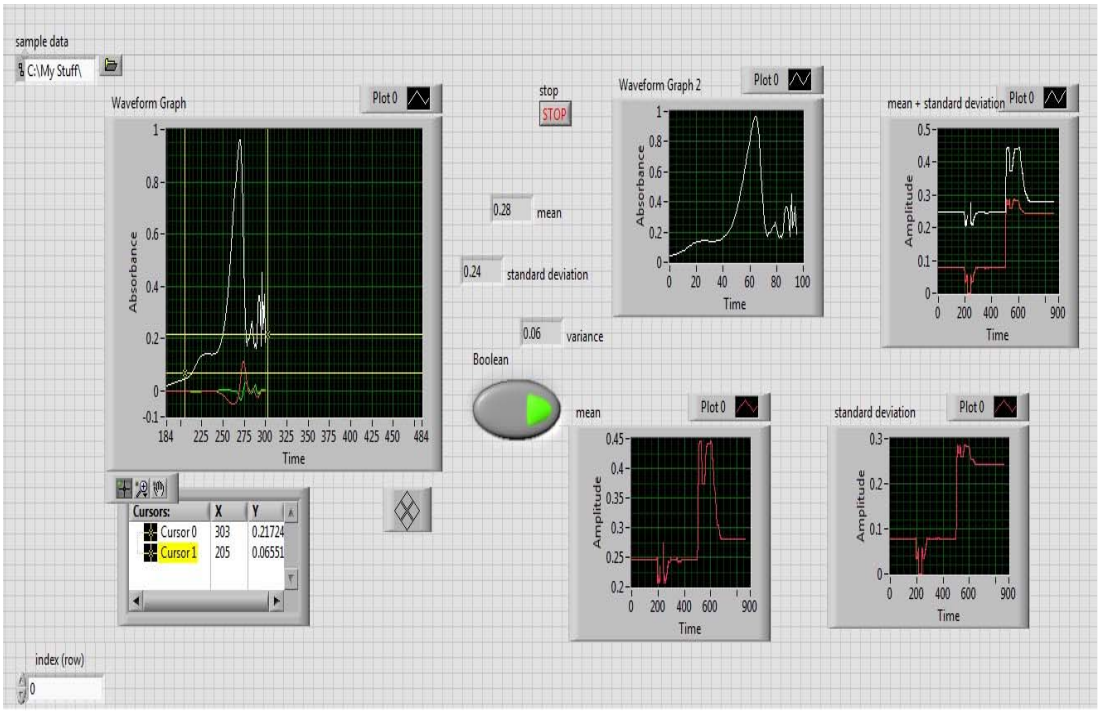
IV. Tabular Form

S.No	Absorbance	Mean	Standard Deviation
1	0.007	0	0
2	0.006	0	0
3	0.0014	-0.001	0
4	0.019	-0.001	0
5	0.035	-0.001	0
6	0.046	-0.002	0
7	0.052	-0.003	0
8	0.062	-0.004	0
9	0.065	-0.004	0.001
10	0.076	-0.005	0.001
11	0.095	-0.007	0
12	0.109	-0.006	0
13	0.121	-0.005	-0.001
14	0.13	-0.004	-0.001
15	0.235	-0.02	0.003
16	0.375	-0.038	0.004
17	0.962	0.008	-0.027
18	0.232	-0.008	-0.007
19	0.195	0.009	0.004
20	0.312	-0.021	-0.011

BLOCK DIAGRAM



FRONT PANEL



V. CONCLUSION

The paper dealt with finding the absorbance and transmittance of the samples and here samples are taken and the responses of the drugs are observed in the UV PROBE and mathematical calculations are performed on the corresponding spectrum. The output of all the statistical analysis values like mean, median, mode, standard deviation, range are taken for samples.

VI. REFERENCES

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