



LABOMED MARKETING AND TRAINING INFORMATION

- 1- Visible and UV-VIS Spectrophotometry
- 2- Spectro Line
- 3- Market Analysis 2001-2006
- 4- Labomed Product Markets and Applications

LABOMED INC.

"Exceptional quality spectrophotometers at fantastic prices"



2728 S La Cienega Blvd. Los Angeles, CA 90034 U.S.A

TEL (310) 202-0811 FAX (310) 202-7286 - Email: spectro@labomed.com Website: www.labomed.com



LABOMED, INC.®

Visible and UV/Vis SPECTROPHOTOMETRY



LABOMED, INC.[®]

Who uses spectrophotometers?

- Academia & Teaching
- Biological & Biochemical Research
- Bio' & Biochem' Monitoring & Quality Control
- Chemical Research
- Chemical Process Monitoring & QC
- Pharmaceutical Research
- Pharmaceutical Monitoring & QC
- Environmental Laboratories
- Hospital Pharmacy & Clinical Laboratories
- Industrial Laboratories
- etc. etc. etc.
- **Basically just about ANY laboratory!**



LABOMED, INC.[®]

The Beer-Lambert Law

WHEN THE CORRECT WAVELENGTH IS USED:

- Transmittance, $T = I/I_0$
- Absorbance = $\log 1/T$
- The concentration, C of a light absorbing molecule is proportional to the Absorbance:

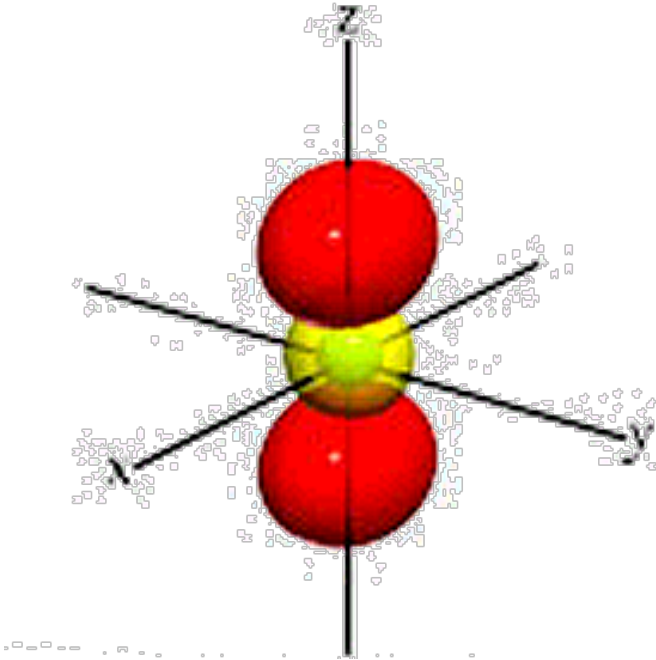
$$A = (a) \times (b) \times (C)$$



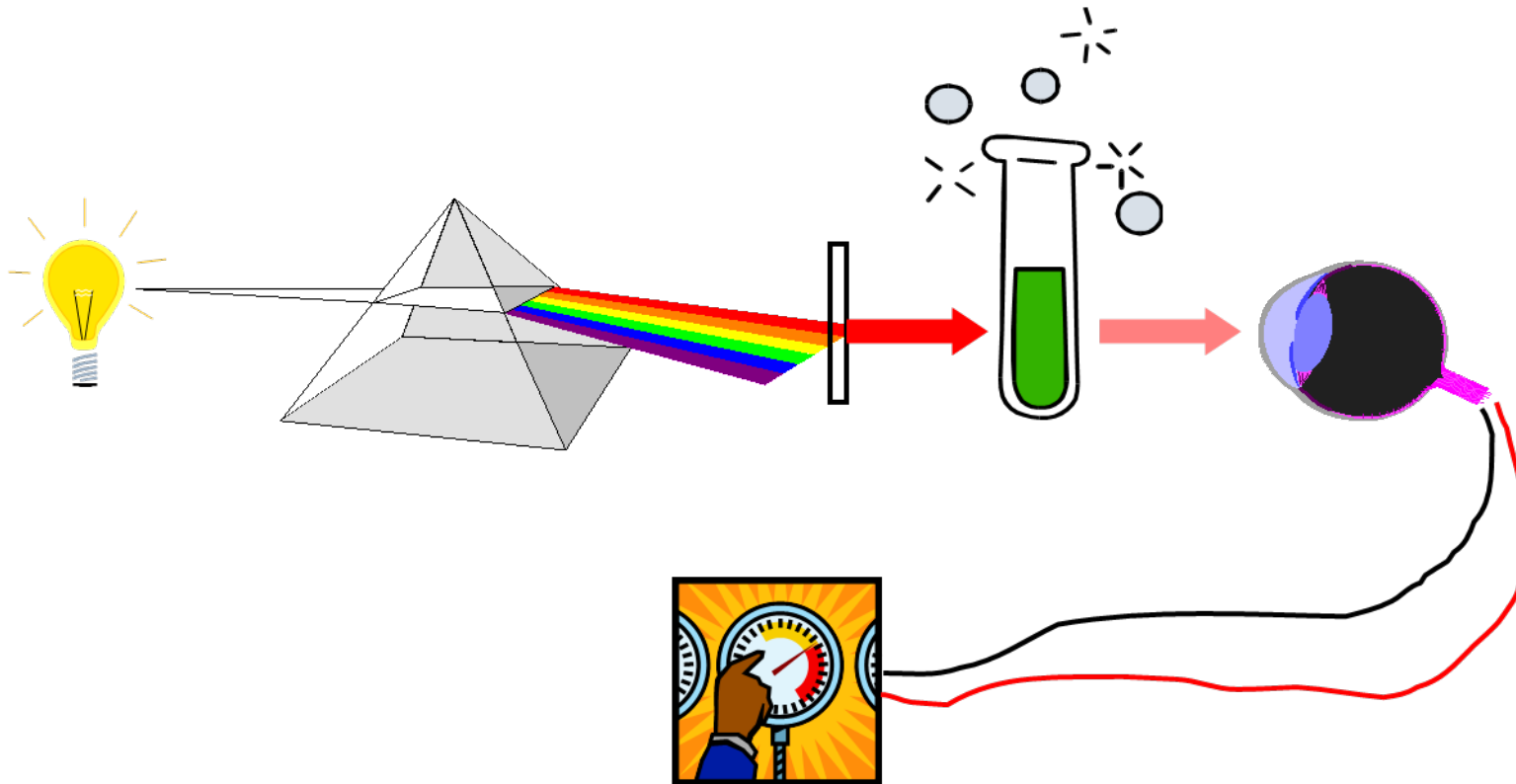
Basic theory

MOLECULAR ORBITALS

- Electrons in molecular orbitals can interact with photons of light.
- Only certain energy levels are allowed.
- Only a photon with the right energy (wavelength) can promote the electron to the “excited state”.
- The orbital returns to the “ground state” by colliding with another molecule and giving up this tiny amount of energy in the form of heat.

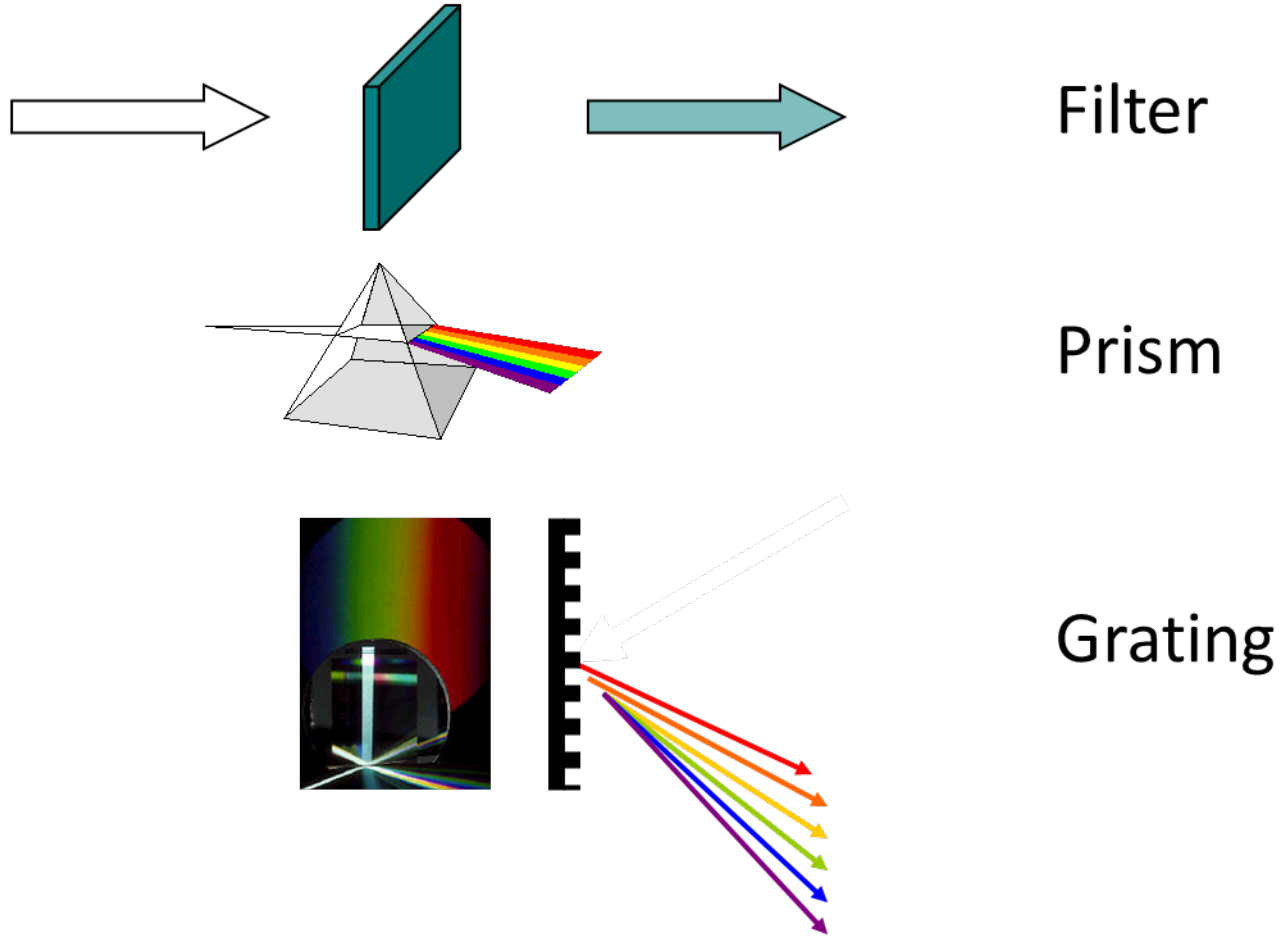


What's a spectrophotometer?

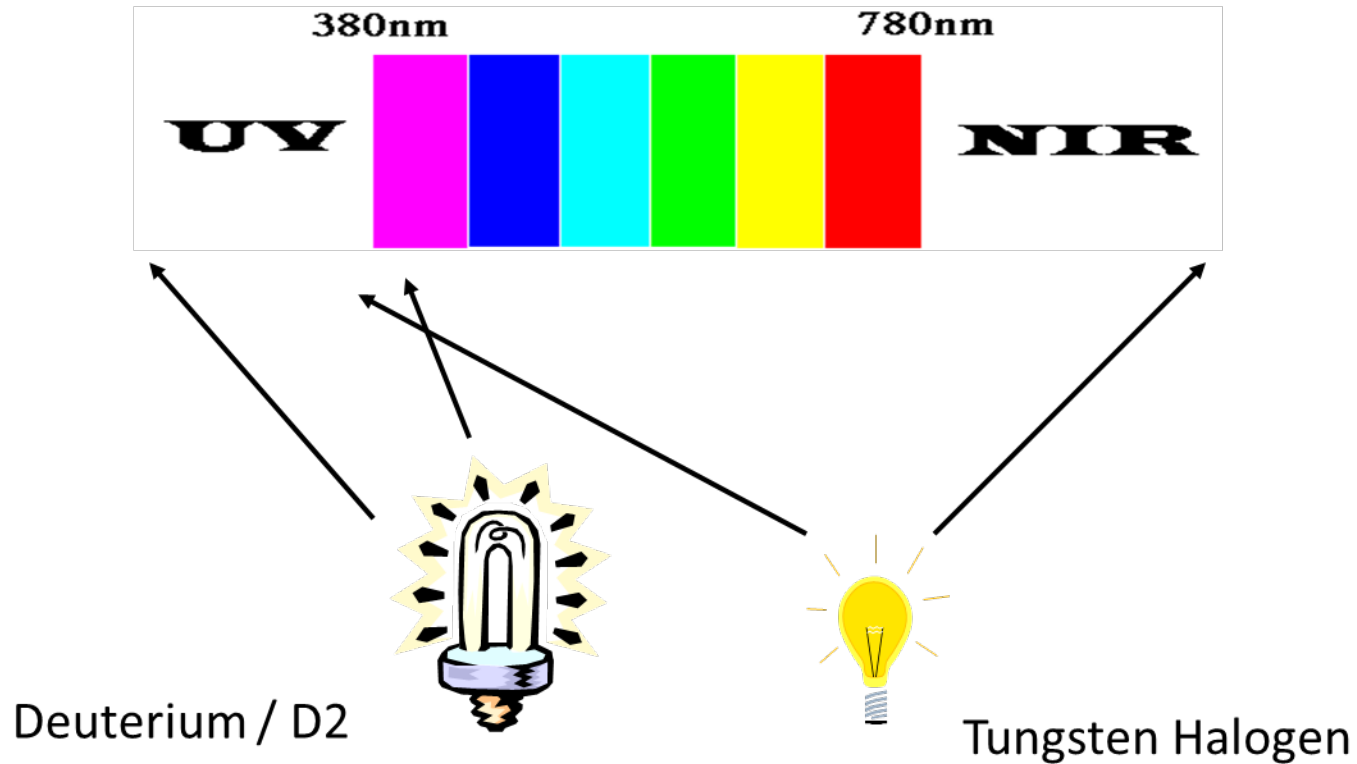


LABOMED, INC.[®]

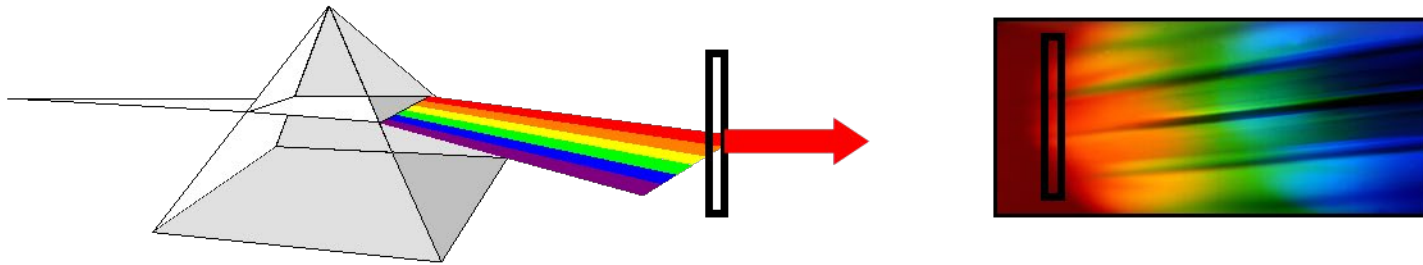
Dispersing elements



Light sources

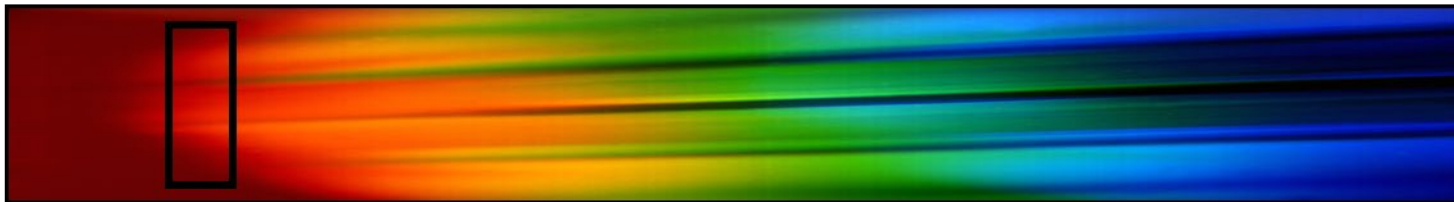


Spectral bandwidth



Eg. Set λ to 700nm

If SBW of instrument is 8nm



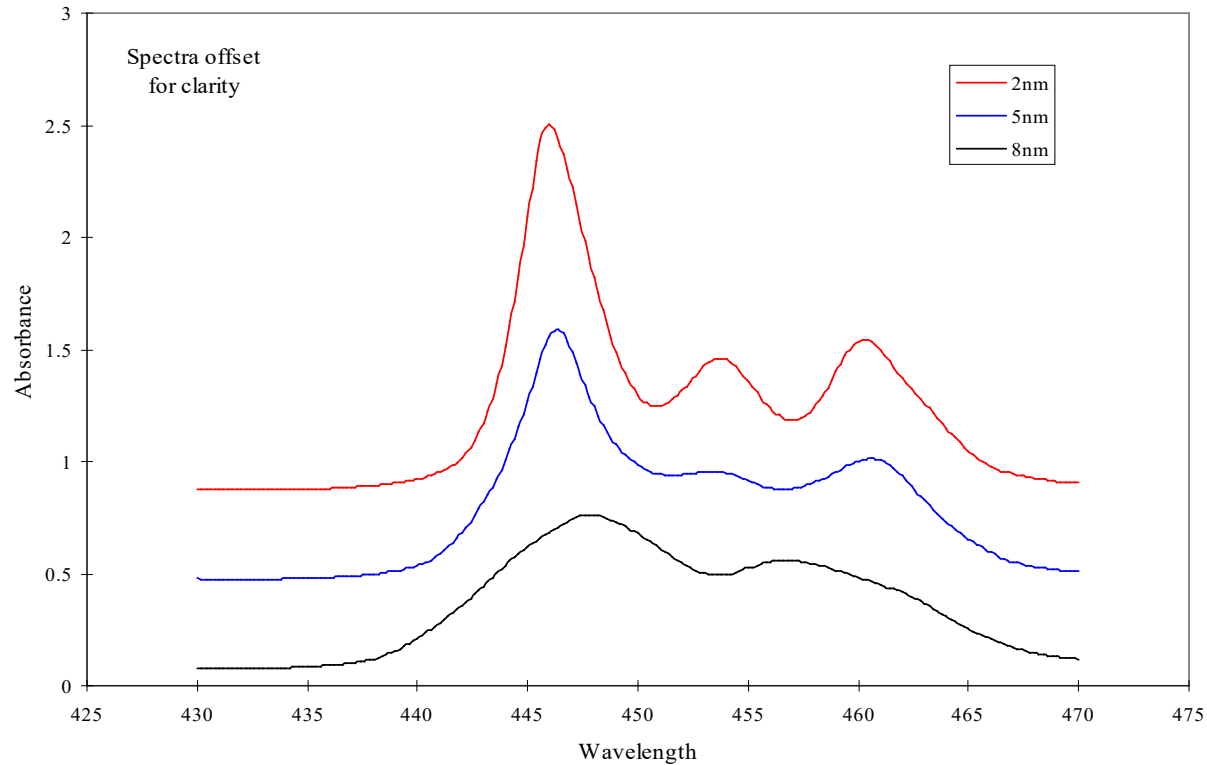
696 704

Also often referred to as - Bandwidth, Bandpass, Slit Width, Resolution.



LABOMED, INC.[®]

Spectral bandwidth



The effect of SBW on the ability to resolve spectral peaks



LABOMED, INC.[®]

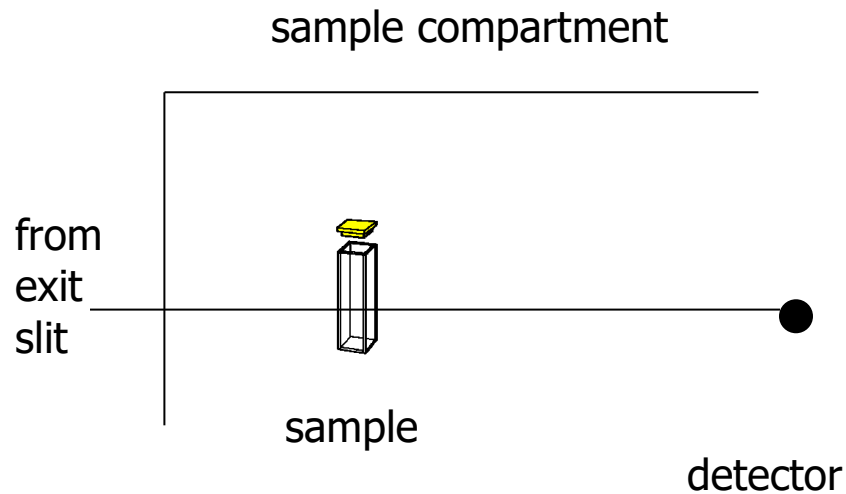
Range of instrument types

- Simple Fixed λ Filter Instruments
- Grating Instruments (used at one λ at a time)
- λ Scanning Grating Instruments - Fixed SBW
- λ Scanning Grating Instruments - Variable SBW



Single beam

FILTER PHOTOMETER AND GRATING SPECTROPHOTOMETER



- Low cost, easy to use and maintain

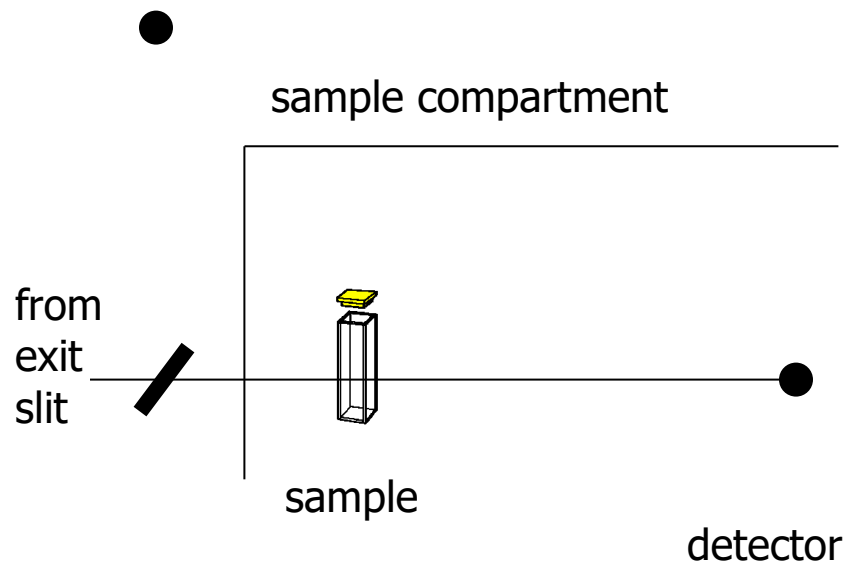
but:

- Two separate steps to each measurement
- Cannot easily do spectral scans to find the best wavelength



LABOMED, INC.®

Single split beam



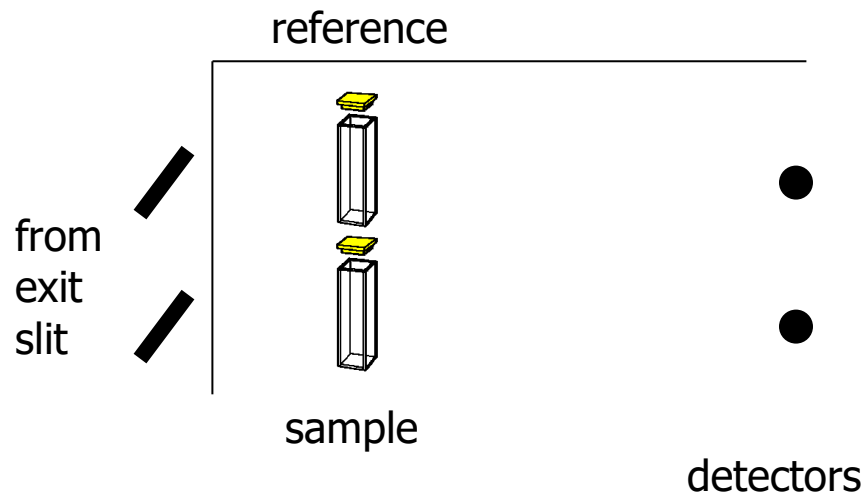
- Low cost, easy to use and maintain, improved stability over the single beam

but:

- Still just as much work to make a single wv measurement or a scan measurement



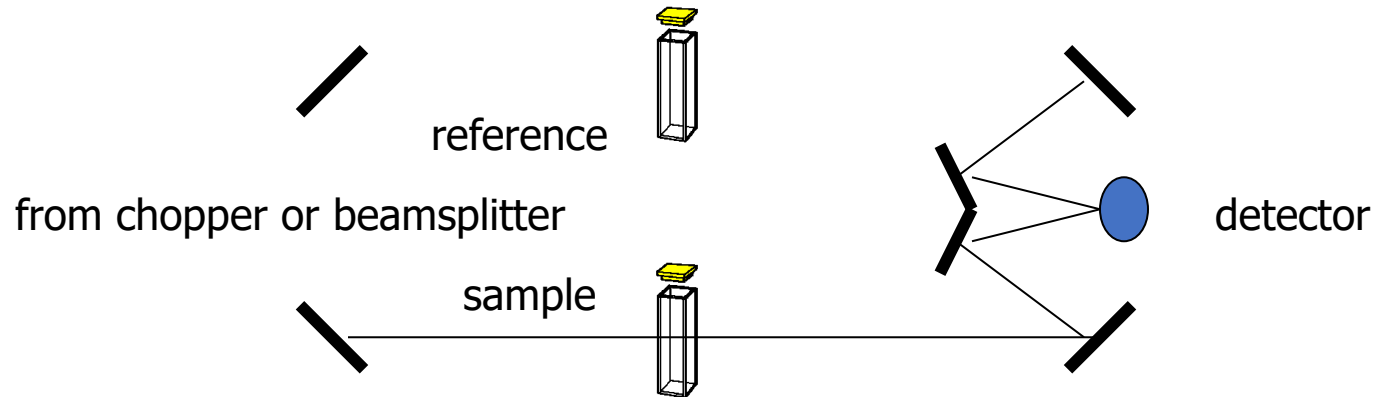
Dual beam



- Improved stability
- Continuously refers to the reference
(repeatedly inserting the reference is not necessary)
but:
- Two detectors cannot be perfectly matched – one will detect light differently



True double beam



- Improved stability
- Continuously referencing
- Single light detector measures the sample and reference the same way (If you have two detectors, there is always some optical difference between them
but - More expensive



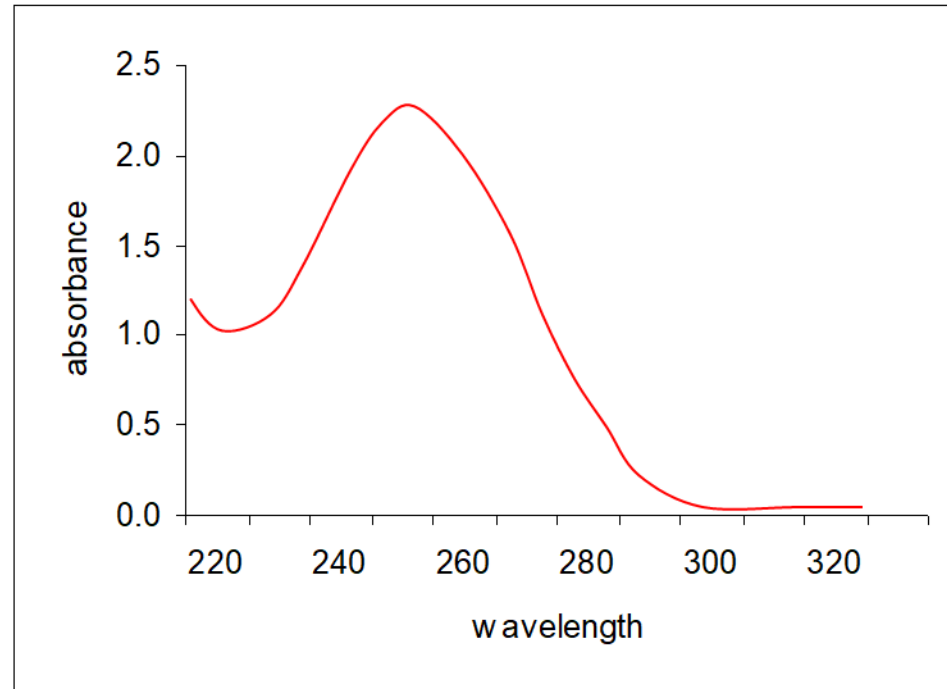
How to find the right wavelength?

- Qualitative analysis: The wavelength(s) at which the peaks occur is a characteristic of only one absorbing molecule
- Quantitative analysis: The height of this Absorbance peak is proportional to the concentration of the light absorbing molecule



How to find the right wavelength?

Do a spectral scan (i.e., measure the Absorbance at each wavelength) and plot the Absorbances vs the wavelengths



➤ Look for a peak value



LABOMED, INC.[®]

The Spectro line of Vis and UV/Vis Spectrophotometers Labomed Inc.



LABOMED, INC.[®]

Types of Spectrophotometers

There are different beam systems in Spectroscopy as follows:

1- SINGLE BEAM

Types of Single Beam Spectrophotometers:

A) Visible (VIS) Wavelength (From 330 to 1000nm):

1. Spectro 23
2. Spectro 24RS
3. Spectro 2000RS
4. Spectro 2000RSP
5. Spectro W-2100



LABOMED, INC.[®]

Types of Spectrophotometers

B) UV-VIS Wavelength (This means it can read Ultra-violet and Visible wavelength, and can read from 190 to 1100 nm.)

6. Spectro UV-VIS (UV-2502)
7. Spectro UV-VIS (UV-2505)
8. Spectro UV-VIS (UV-2550)

**2- SPLIT BEAM or DUAL BEAM
(these are all UV-VIS Spectrophotometers)**

Types of Split or Dual Beam Spectrophotometers:

9. Spectro 8 Auto Cell (UVS-2700)
10. Spectro UV-VIS 8 Auto Cell Variable Bandwidth (UVS-2800)



LABOMED, INC.[®]

Types of Spectrophotometers

3. DOUBLE BEAM (these are all UV-VIS Spectrophotometers and they can read from 190 to 1100nm.)

Types of Split or Dual Beam Spectrophotometers:

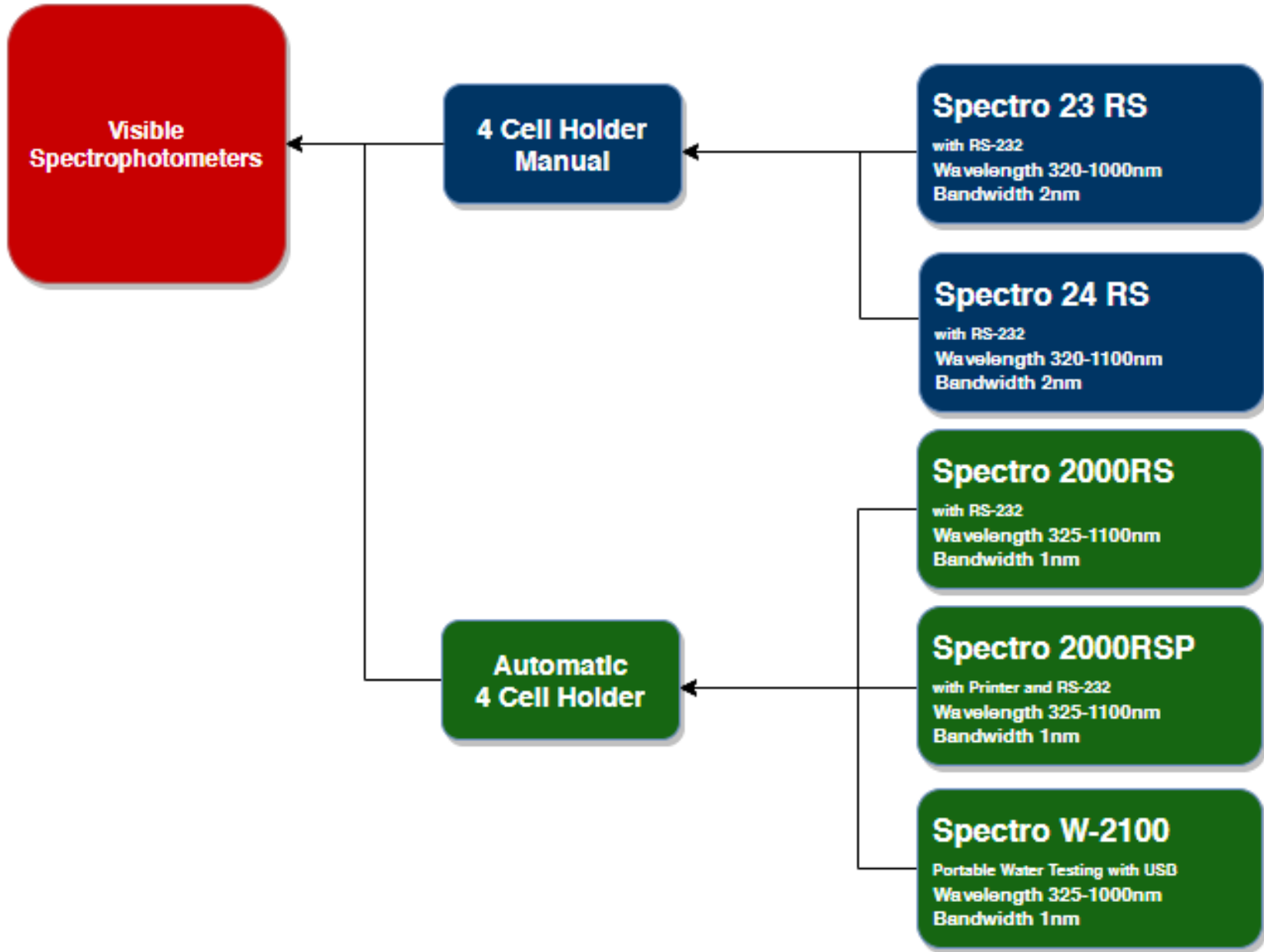
11. Spectro UV-VIS Double (UVD-2950) 2 cell holder
12. Spectro UV-VIS Double (UVD-2960) 2 cell holder
13. Spectro UV-VIS Double (UVD-3000) – 8 Auto Cell holder and 1 Cell fixed
14. Spectro UV-VIS Double (UVD-3200) – as above with Variable Bandwidth
15. Spectro UV-VIS Research (UVD-3500) Variable Bandwidth

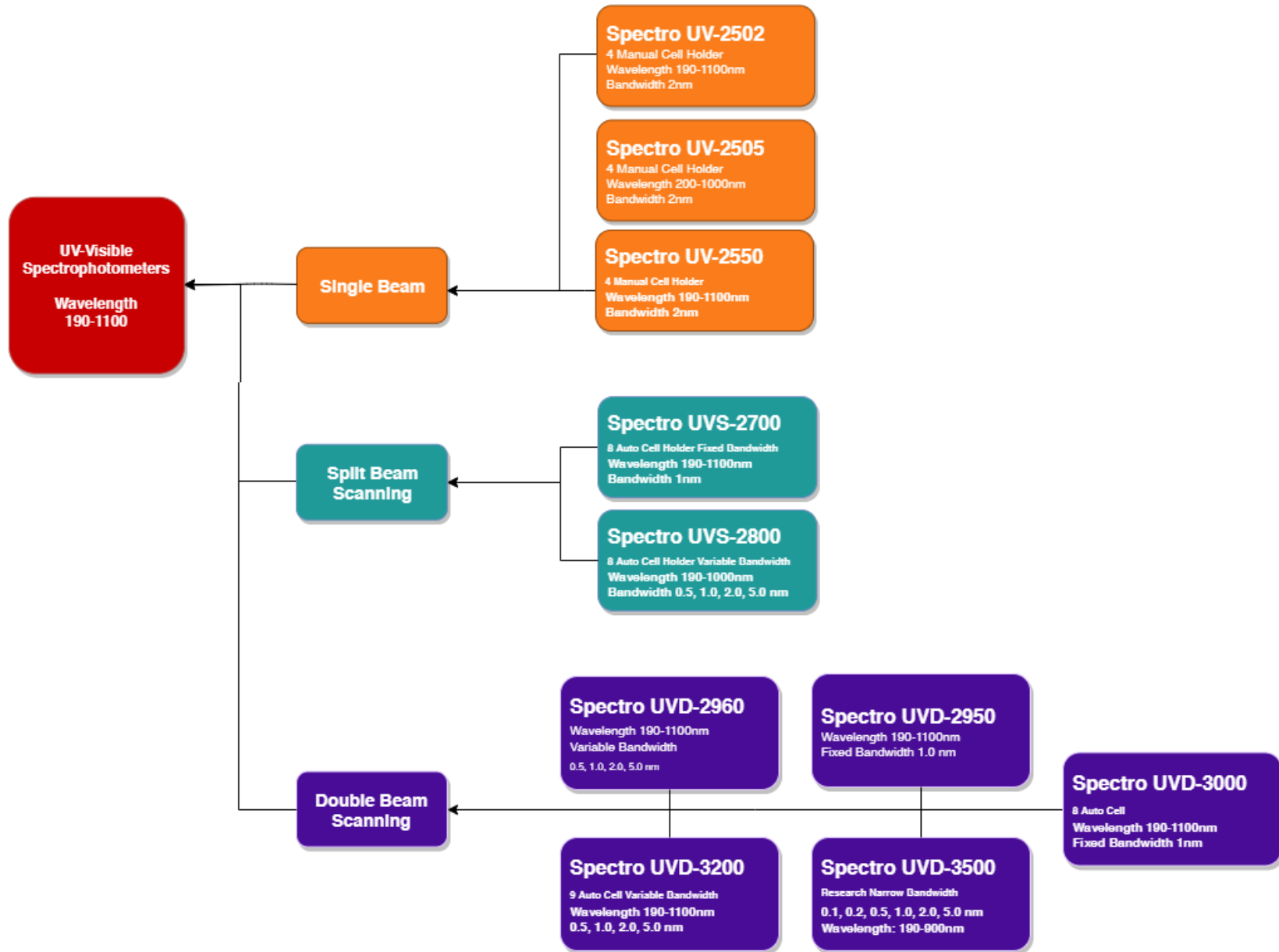
4. Atomic Absorption Spectrophotometers

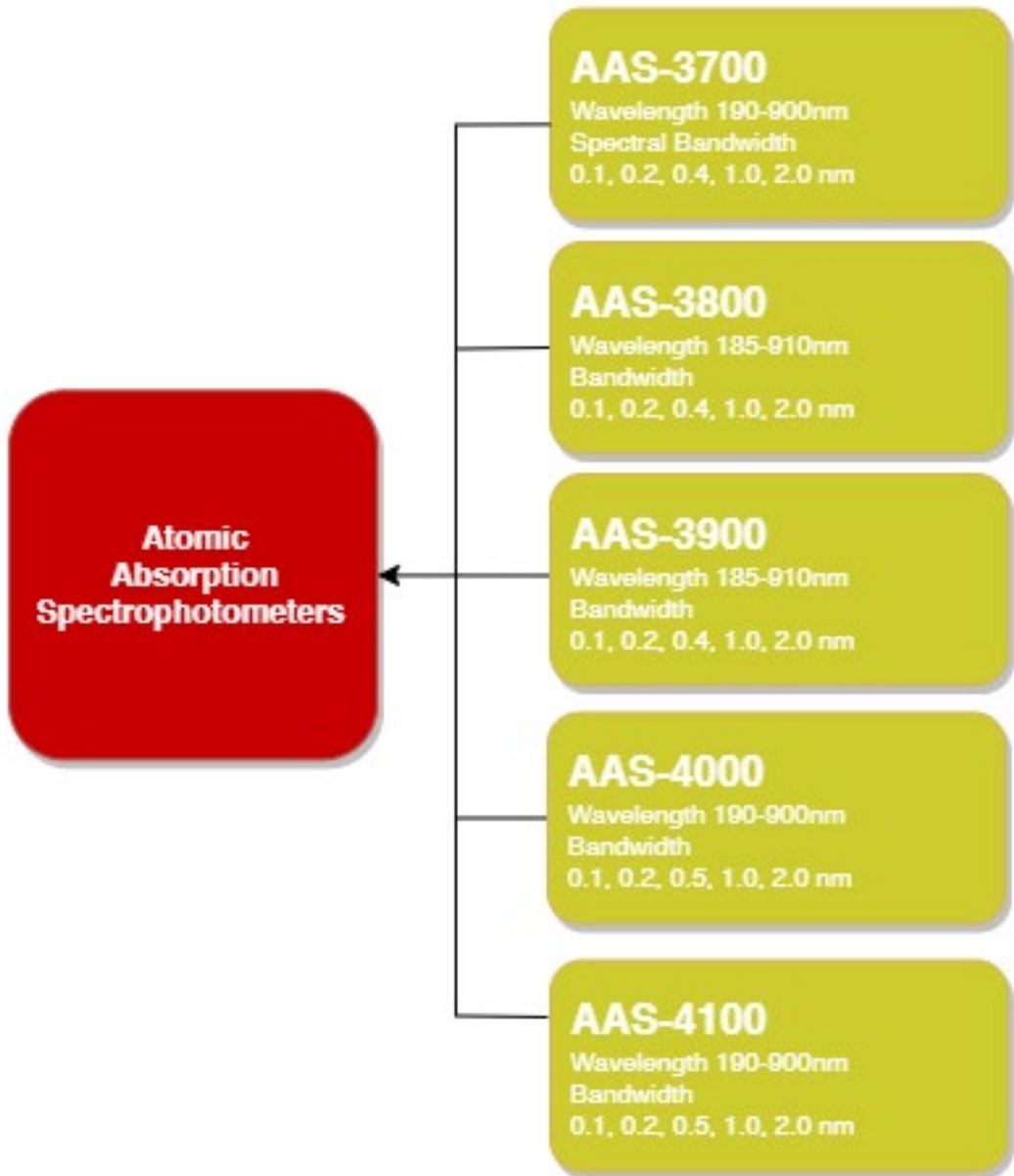
- 16.AAS-3700 Variable Bandwidth
- 17.AAS-3800 Variable Bandwidth
- 18.AAS-3900 Variable Bandwidth
19. AAS-4000 Variable Bandwidth
- 20.AAS-4100 Variable Bandwidth



LABOMED, INC.[®]







Spectrophotometers

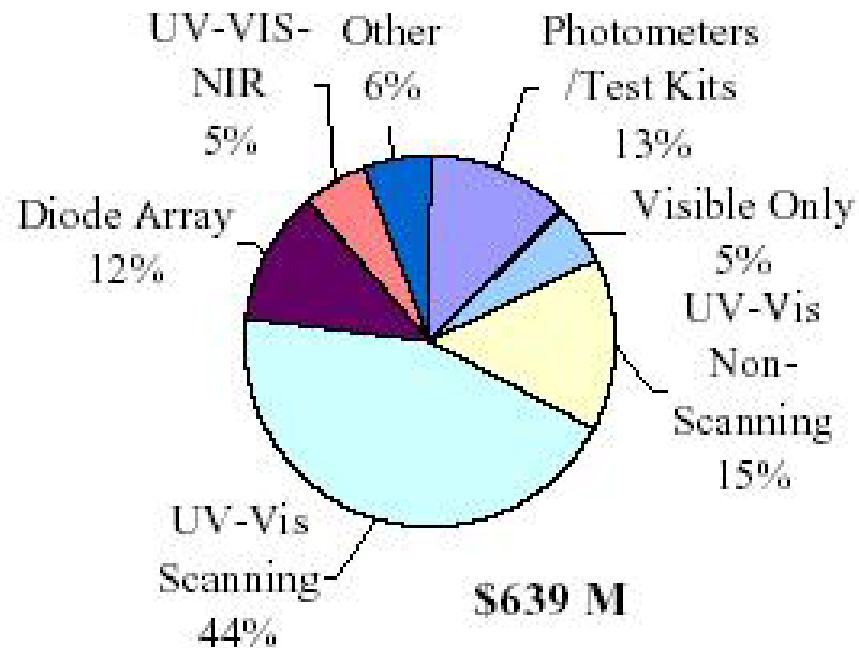
Market Analysis

2001-2006



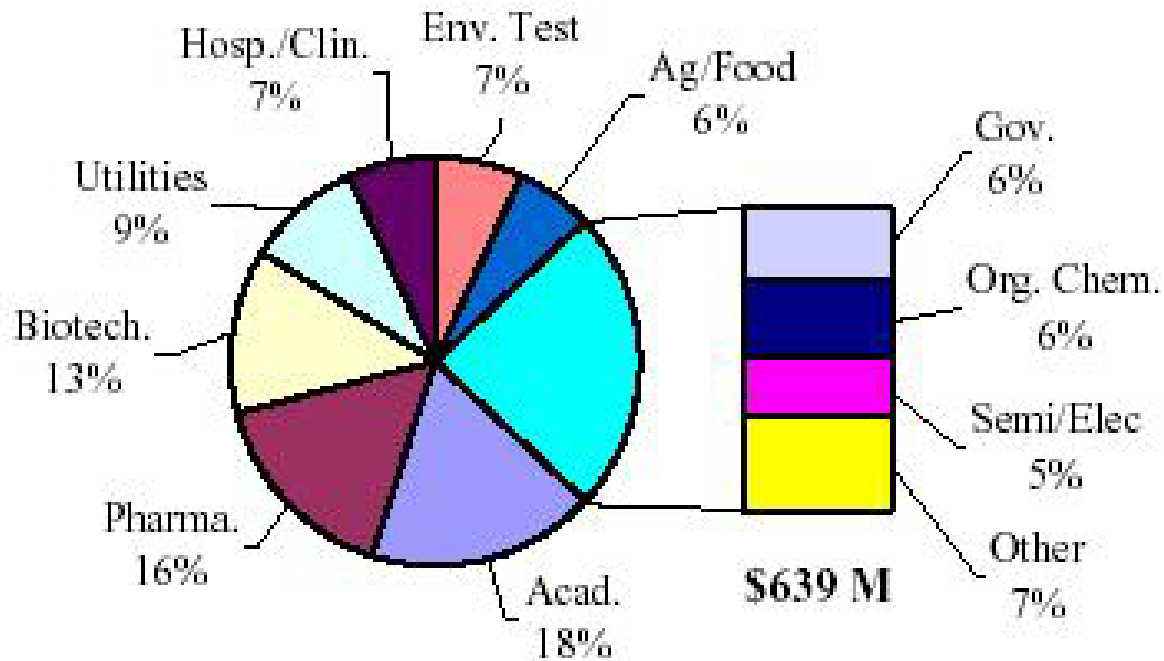
LABOMED, INC.[®]

Worldwide Demand by Product Type 2001



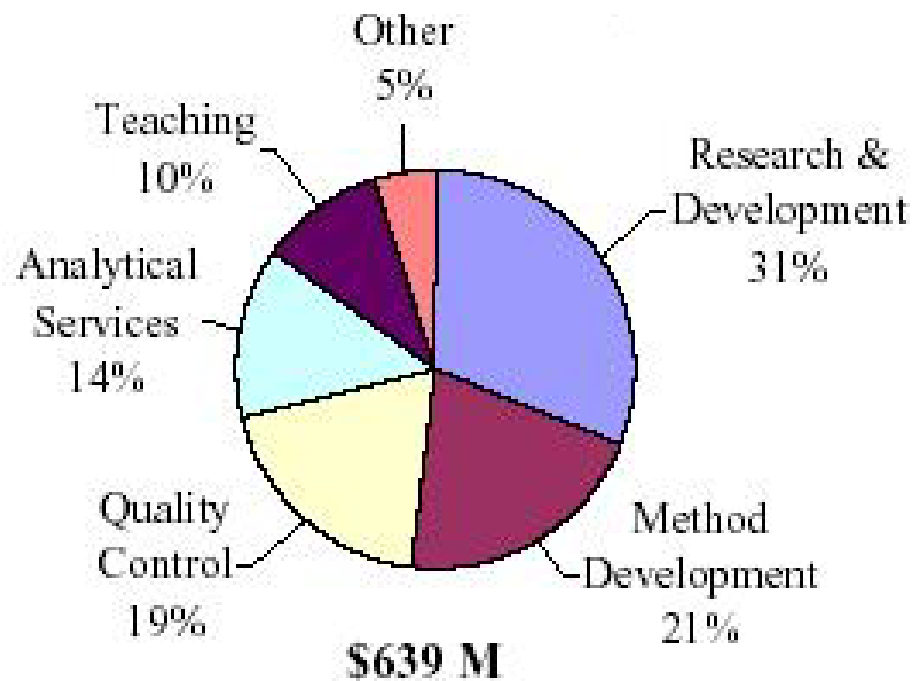
LABOMED, INC.[®]

UV-Vis Worldwide Demand by Industry 2001



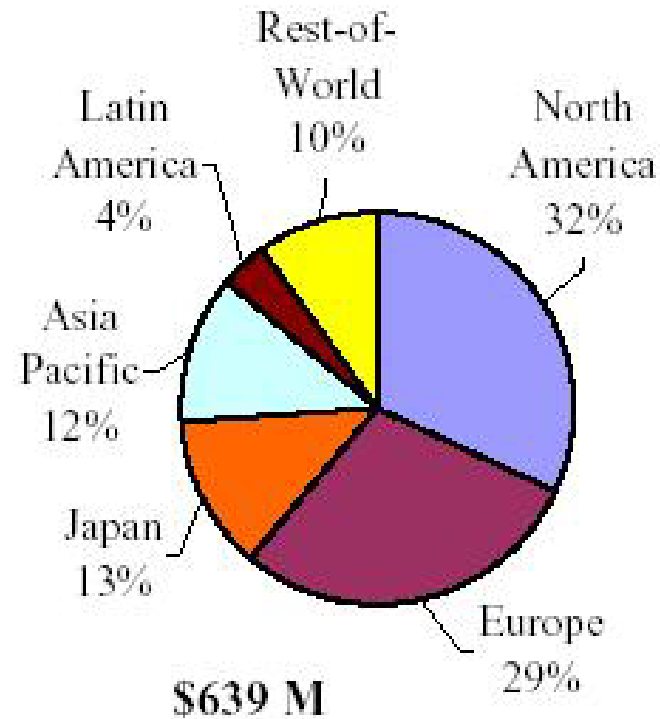
LABOMED, INC.[®]

UV-Vis Worldwide Demand by Function 2001



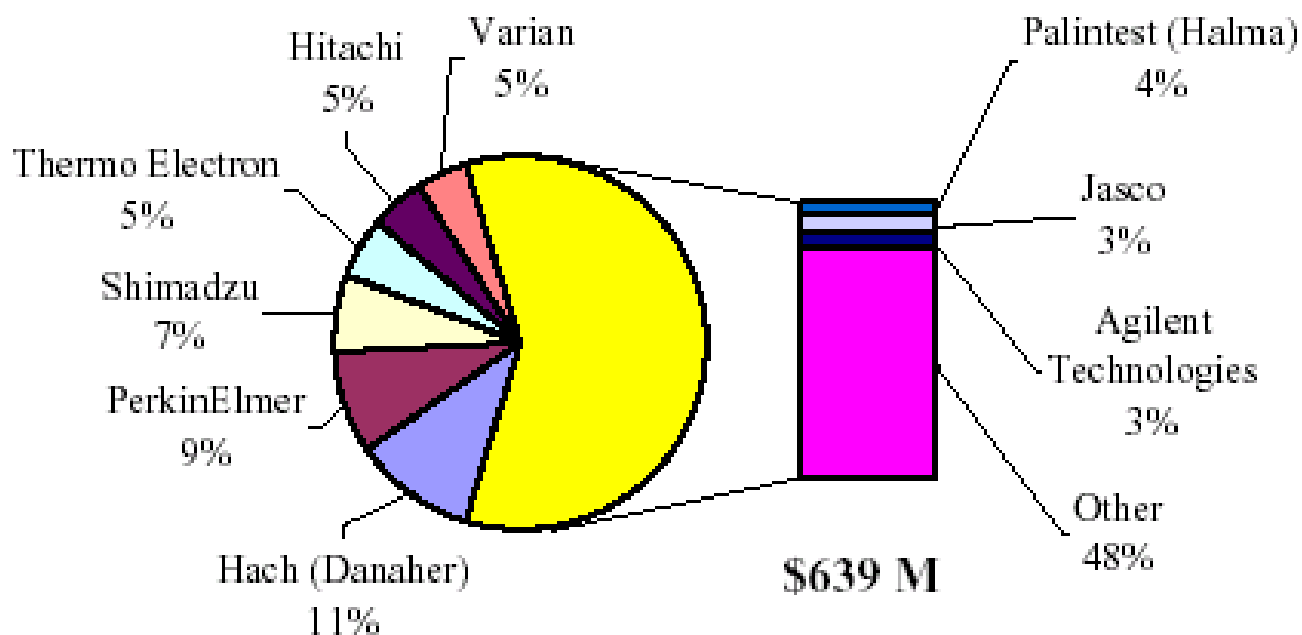
LABOMED, INC.[®]

UV-Vis Worldwide Demand by Region 2001



LABOMED, INC.[®]

UV-Vis Worldwide Vendor Share 2001



LABOMED, INC.[®]

Summary

- The worldwide UV-Vis market is about 700 million dollars.
- Scanning and diode array are the fastest growing instrument types. There is sustained, flat demand for Vis and UV-Vis.
- UV-vis is in demand by many market segments and functions within each segment.
- UV-Vis spectrophotometers have hundreds of applications.
- North America and Europe are the largest geographic markets, but Asia-Pacific is growing the fastest. Japan and Latin America are flat.



LABOMED, INC.[®]