UNICO®

S2100+ and S1205 Series
SPECTROPHOTOMETER

SOFTWARE USER'S MANUAL

Software Version V1.4
(MANUAL R1)

Table of Contents

Introduction

The **UNICO® Application Software—UNICO 2100+** has been designed to operate with **UNICO® Spectrophotometer Model 2100+ and 2100UV+ and S1205**. The software runs on a PC (personal computer) with Windows® 2000 Professional, or Windows® XP operating systems.

Your **UNICO® Application Software** package includes:
- One CD containing the software (**UNICO 2100+**)
- Software User's Manual
- A 6' null modem connection cable with 9-pin and 25-pin female connector's on both ends or USB cable.

The **UNICO® Application Software** performs the following methods for analysis:

Absorbance/%Transmittance/Concentration: measure the Absorbance, %Transmittance, Concentration/Standard, or Concentration/Factor at a single wavelength within the range of **325~1000** nm (**Model 2100+ and 1205**) or **200~1000** nm (**Model 2100UV+**).

Standard Curve: create a calibration curve (choice of 4 curve fits) with up to 8 standard solutions at a single wavelength to determine concentrations of unknown samples.

Kinetics (Absorbance vs. Time Kinetics): measure a sample's absorbance change over a selected period of time, store the test results in data table, and display the results graphically.

Scanning (Absorbance/Transmittance vs. Wavelength)**:** permit the operator to scan at interval of 1 nm at any wavelength range of **325 (200) ~1000** nm featuring zoom and peak/valley pick.

Minimum Computer Requirements

To properly install and operate the enclosed software, it is required to have the following minimum computer configuration:

PC with:
- 64 MB RAM
- Pentium processor
- 10 MB of free space on memory
- VGA Color Monitor
- Mouse and keyboard

NOTE: The **UNICO® Application Software** provided will **NOT** function with a **Macintosh/Apple** or **Linux** computer.

Software Installation

Loading Software to Computer

To install the software, please close any open programs and disconnect from the Internet if online, then follow the instructions below.

Step 1: Insert **UNICO® Application Software** CD into the CD drive of your PC.

Step 2: Right click **Start** of your PC and click **Explore**, locate the CD Drive and click to open.

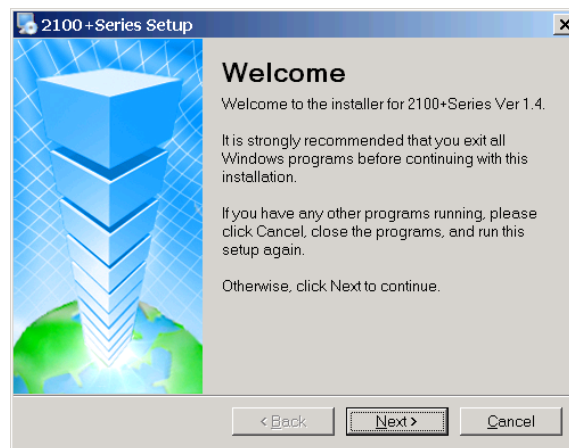Step 3: Click **setup.exe**. The setup screen will pop up as shown in Fig. 1.

Fig. 1   Setup Startup Screen

Step 4: Type your **Name** and Your **Company** Name as Figure-2 shown, then click **Next.**
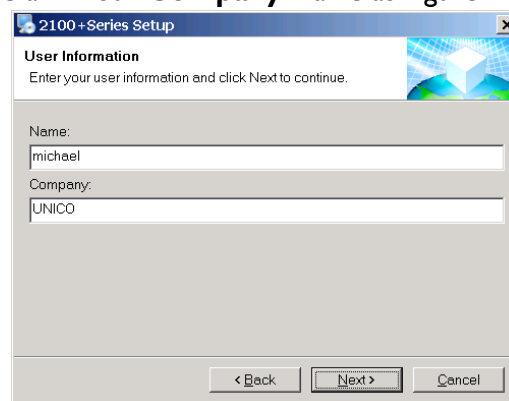

Fig. 2   User Information

Step 5: The software will be installed in your Program Files. To change location click the **Change** button (Figure-3), you can open the **Browse for Folder** window and choose the **Folder** where you want the software to be installed. If the folder selection is OK, then click **Next** button.
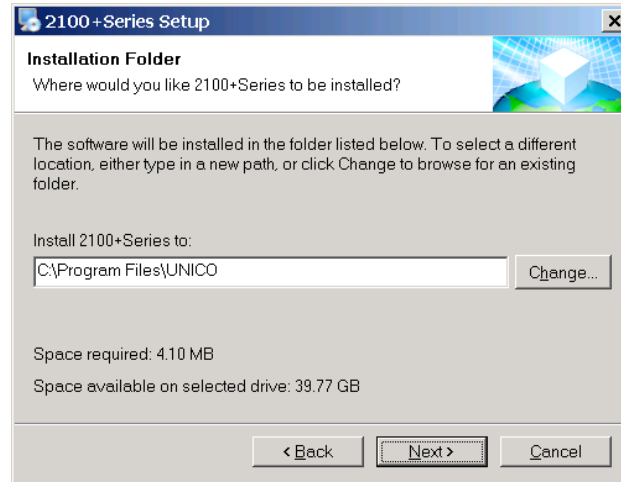

Fig. 3   Software Location on PC

Setp 6: Click **Next** button (Figure-4) to continue **UNICO 2100+** installation.
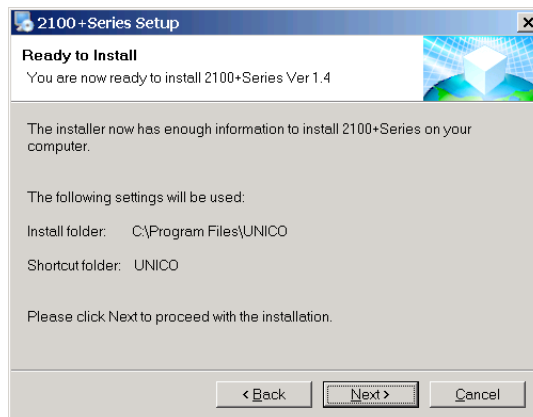

Fig. 4   Ready to Install

Step 7: Wait for the message stating the software **Installation completed successfully** and click **Finish** button to end the installation.
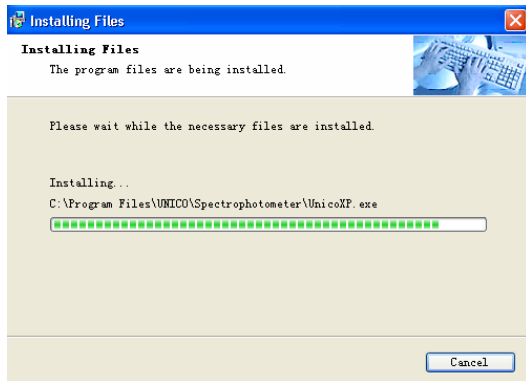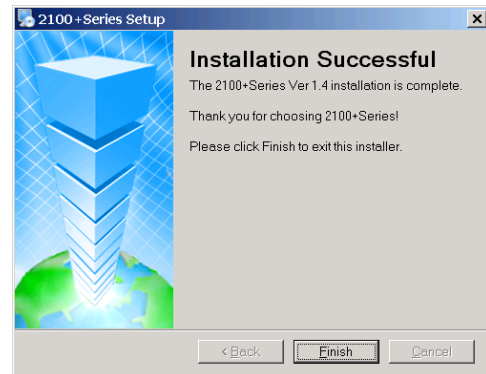
Figure-5 Installation in Process

Fig. 6   Installation Successful

The **UNICO 2100+ icon** will be shown on your desktop (Figure 7).
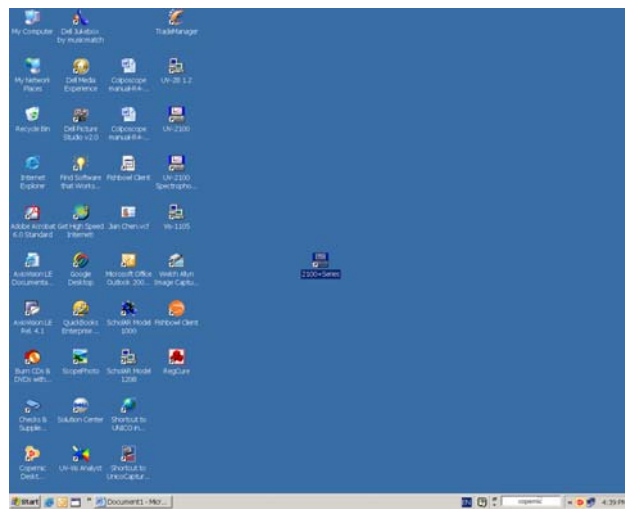

Fig. 7   **UNICO 2100+** Icon on the Desktop

To use USB communication CP2101x USB driver is required. If your computer does not have CP2101x driver installed please refer to the "Connecting Compurter to the Spectrophotometer" section in this manual.

Congratulations! You have now installed your **UNICO® Application Software UNICO 2100+** in your PC for your Model **2100+/2100UV+ and 1205** Spectrophotometer.

Communication Ports and USB Driver

Use RS232 Port for RS232 printer and for Internal Software(Firmware) Upgrade:

When RS232 connection is used set the RS232/USB selelction switch to the right (upgrade: for internal software upgrade and RS232 printer). The communication port is usally COM1. It may vary. So check the port assignment on your computer following the steps below:

- At your computer main screen right-click on "My Computer".
- Select and click on"Manage";
- then select and click on "Device Management";
- then click on " Ports(COM &LPT)" the port assignment information is displayed as shown below:
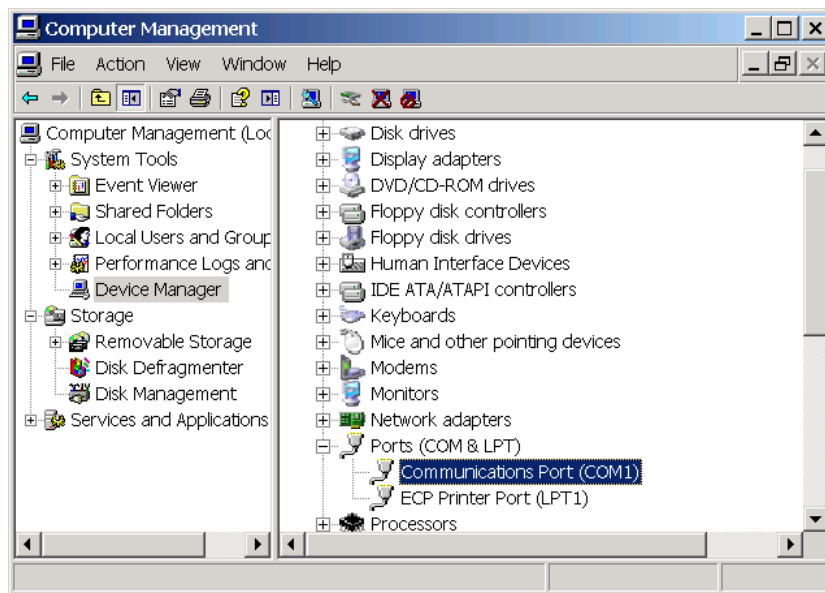
Use USB Port for PC Connection:

USB Port is designed for PC computer connection for use with PC application software (not for firmware upgrade). To use USB port: 1) set the RS232/USB selection switch to the left (normal). 2) USB driver CP2101 (USB to UART Bridge Controller) must be installed in your computer.
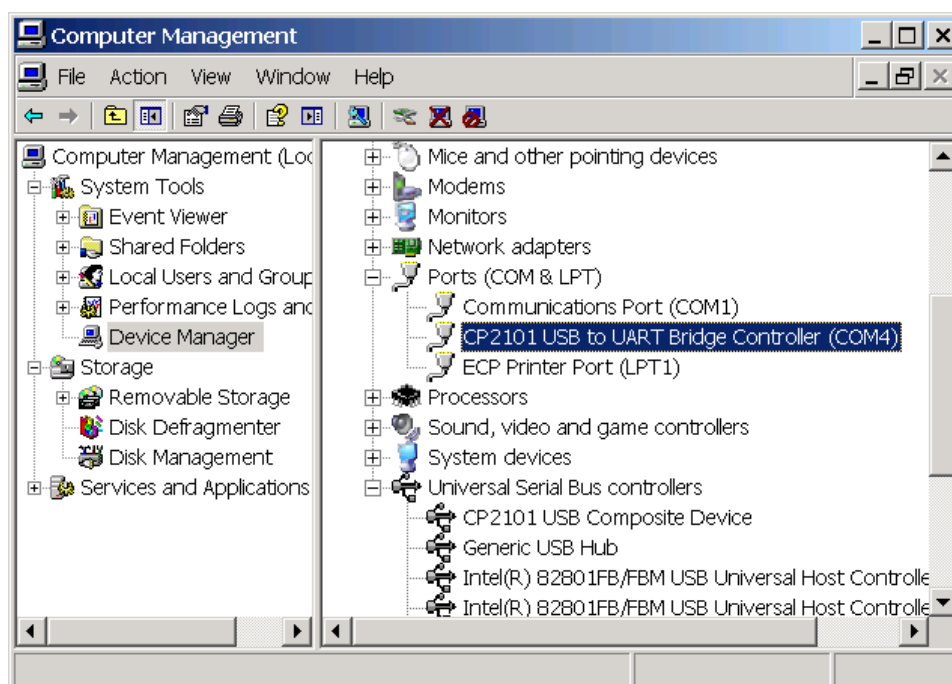
A copy of USB driver CP2101x is supplied in the CD. You may download a latest version of CP2101x from Internet.

To install USB driver CP2101 onto your computer connect your computer to the spectrophotometer USB port (make sure the RS232/USB selection switch is set on the left normal position). Turn on the spectrophotometer. Your computer finds the new hardware and starts to search for hardware driver. Direct it to CD drive or other location where the USB driver CP2101 is saved.

A communication port will be assigned for CP2101 in your computer. The port assignment may vary depend the specific computer configuration. To check the port assignment follow the steps below:

● At your computer main screen right-click on "My Computer".
● Select and click on"Manage";
● then select and click on "Device Management";
● then click on " Ports(COM &LPT)" the port assignment information is displayed as shown below. COM4 is assigned in this case. Select the same port (COM4) when connecting PC to the spectrophotometer.

Connecting Computer to the Spectrophotometer

Step 1: Remove the USB Cable from the bag.

Step 2: Locate the USB port on the back of your PC. Connect one end to your computer.

Step 3:   Connect the other end of the USB cable to your Model 1205 or Model **2100+/2100UV+** and secure tightly.

Step 4: Turn on your PC (if not already on) and your spectrophotometer on (if not already on, let it warm up for fifteen minutes).

Note: If the USB driver CP2101x has not been installed in your PC, a reminder/screen will pop up requesting CP2101x installation. Follow the instruction to install the driver. A copy of USB driver CP2101x is supplied in the CD. You may download a latest version of CP2101x from Internet.

Step 5: Click the 2100+ software icon on your PC. Or click the **Start** button on your PC, scroll to **All Programs**, **UNICO,** and locate the **UNICO 2100+**, and click to open it.

Step 6: The Start-up Screen of **UNICO 2100** will appear as Figure-8 shown.

Fig. 8 2100+ Software Start-up
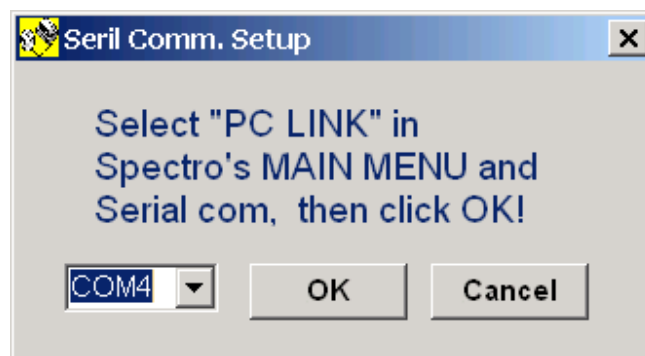
Step 7: Click , a window will pop-up as Figure-9.

Fig.9   Communication Port Selection

Step 8: At the main screen of spectrophotometer 2100+/2100UV+ or 1205, select "PC LINK" and press enter. The LCD display will read:

| PC LINK |
| COMMUNICATING |

WITH PC
Press EXIT To Return

Step 9:   Select the proper port in the pop-up window, push the OK button, and then press
The **UNICO 2100+** will initialize (Fig. 10) and go to the main screen (Figure-11to
Figure-21).

Note: Refer to "**Communication Ports and USB Driver"** for port
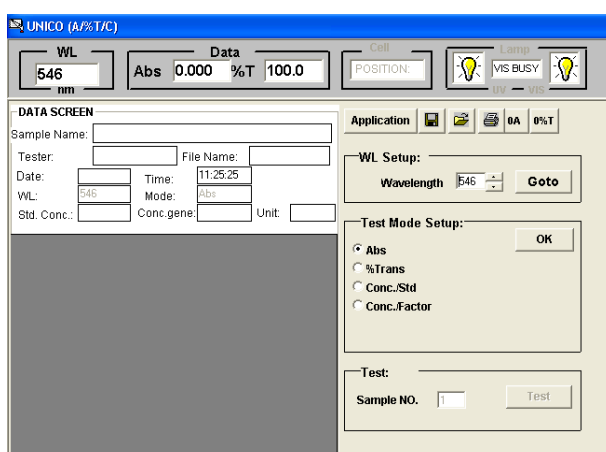assignment in your computer.

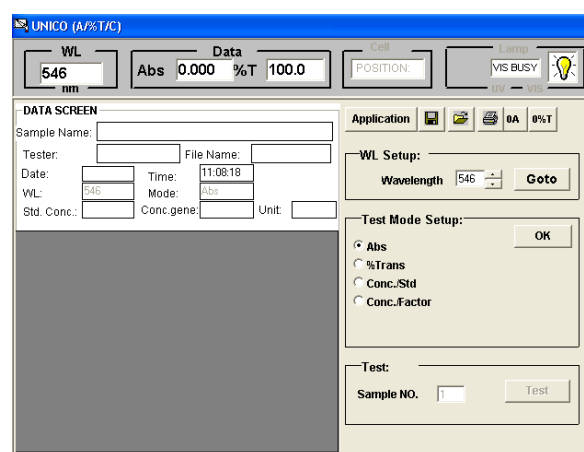Fig. 10   Connecting

Fig. 11 Main Screen – 2100UV+

Fig. 12 Main Screen – 2100+ and 1205

Main Screen Display

After your Model **2100+/2100UV+ or 1205** is connected to your PC, and **UNICO 2100+** is running, your PC will show the **Main Screen Display** like Figure-11.

The **UNICO 2100+** Display Screen can be divided into three parts: **Data Screen** (Figure-13 Data Screen), **Test Status Display** (Figure-14 Test Status Display) and **Test Setup Screen** (Figure-15 Test Screen).

Data Screen has two parts:
- **Data Screen Display** area
- **Data Table**

Data Screen Display area has ten Text Fields. You can input texts to four of them, which have **Sample Name**, **Operator**, **Filename**, and **Date** labels at their left. The Text Fields of **WL**, **Mode**, **C/Std**, **C/Factor**, and **Units,** which have labels at their left, are set by **Test Setup Screen** input. The **Time** Text Field is synchronized with the PC's clock.

Data Table is the blank area under **Data Display Screen**. It records the text results automatically.

Figure-13   Data Screen

Test Status Display
It shows the current status of the **UNICO 2100+:**
- Text Field under **WAVELENGTH** label shows the current wavelength of Model **2100+/2100UV+**
- Text Field under **DATA** label shows the current data both in Absorbance and Transmittance
- Text Field under **SAMPLE** shows the position of the sample in the Cuvette Holder (function not available)
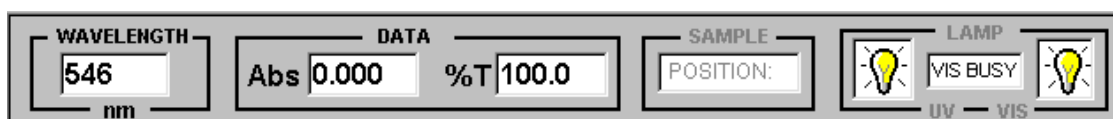- Text Field under **LAMP** shows the UV and VIS lamp status

Figure-14   Test Status Display

Test Screen
It has nine buttons/icon buttons:
- **Application** button: select the four test methods: **A/%T/Conc**, **Standard Curve**, **Kinetics, and Scanning** (Figure-16 Test Methods)
- **Save as** icon button: save the setup or data displayed
- **Load** icon button: open any saved file (.tst)
- **Print** icon button: print all information shown in the **Data Screen** and any data collected
- **0A** button: set **0 Absorbance** and **100%T**
- **0%T** button: set **0%T** (**0%T** black block required in the Cuvette Holder)
- **Goto** button: set the **UNICO 2100**'s wavelength shown at its left. You can either clicking ▲▼ or typing the wavelength into the Test Field at the left of **Goto** button
- **OK** button: enter the test mode selected: **Abs**, **%Trans**, **Conc./Std**, or **Conc./Factor**
- **Test** button: click to begin test and record the test results

You can enter Sample ID number—the numerical number from 1 to 999 or letter or both of them at the right of **SAMPLE ID** label after test mode is selected.
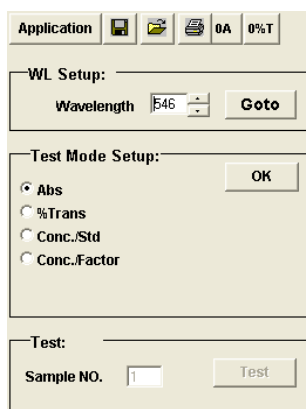
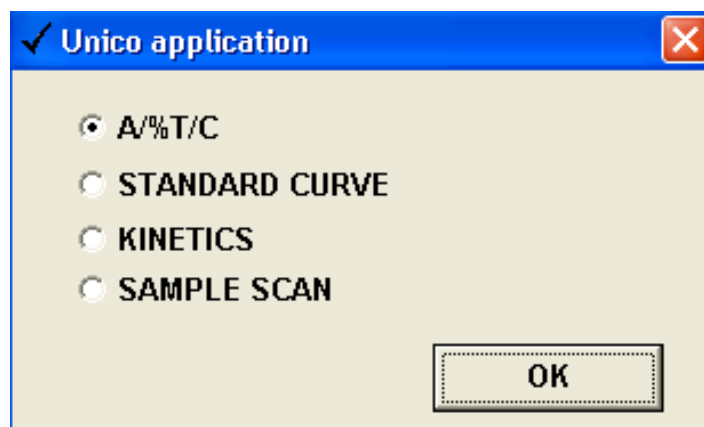Figure-15   Test Setup Screen

Figure-16   Test Methods

Basic Operation

Four Analytical Methods--Absorbance/%Transmittance/Concentration, **Standard Curve**, **Absorbance vs. Time Kinetics, and Scanning** are illustrated below.

Absorbance, %Transmittance, Concentration

The **Absorbance, %Transmittance, Concentration** (**A/%Trans/Conc)** method has the following three modes of operation:
- *Absorbance/%Transmittance*
- *Concentration/Standard*
- *Concentration/Factor*

Main Screen of A/%Trans/Conc

At the **Main Screen**, click **Application**, check **A/%T/C** (Figure-16), and click **OK** button to enter the **Main Screen of A/%T/C.** Type **Sample Name**, **Operator** (name), **Filename**, and **Date** into the appropriate text fields.

Absorbance/%Transmittance Mode
The following are the basic operation procedures.

Step 1: Insert **reference** cuvette or nothing into the Sample Compartment and close the lid.

Step 2: Select the desired **wavelength** by clicking [button] button on the PC screen to set or typing in the desired **wavelength**, click **Goto** button at the right of [button] button to set the wavelength.

Step 3: Click on **0A** button to **blank** the reference (Figure-17).

Step 4: Select the test modes: **Abs** or **%Trans**, and press **OK (or Enter)** button (Figure-18 Test Mode Selection)

Step 5: You may type in Sample ID number at the right of **SAMPLE ID** label after test mode is selected. The ID number can be the numerical number from 1 to 999 or letter or both.

Step 6: Remove the reference (if it is there) and place your sample cuvette into the Sample Compartment, close the lid and click on **TEST** Button. The test results will be displayed in a spreadsheet format in the **Data Table** at the **Data Screen**. Two sample test results are shown in Figure-19 and Figure-20.
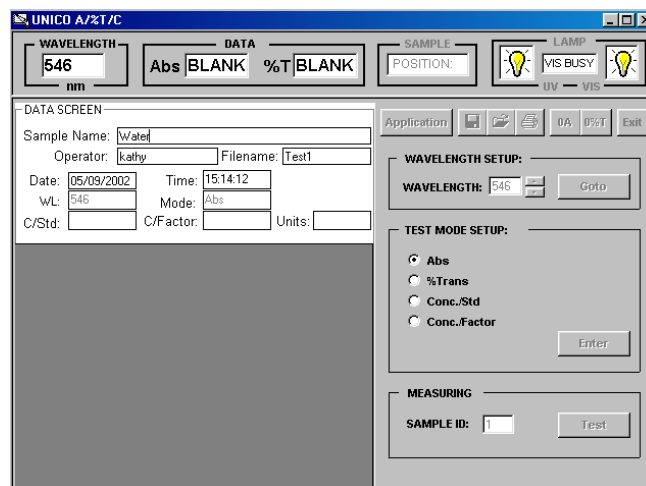

Figure-17   **0A** Blanking
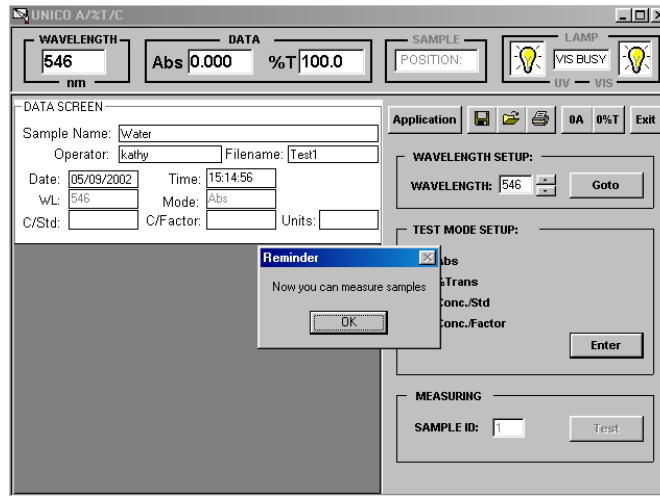
14

Figure-18   Test Mode Selection
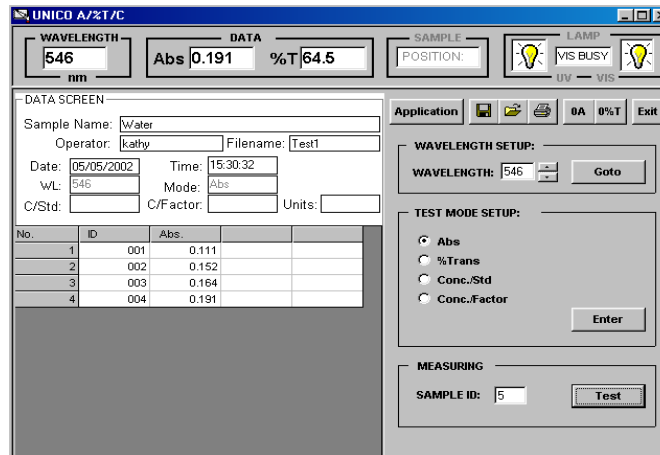

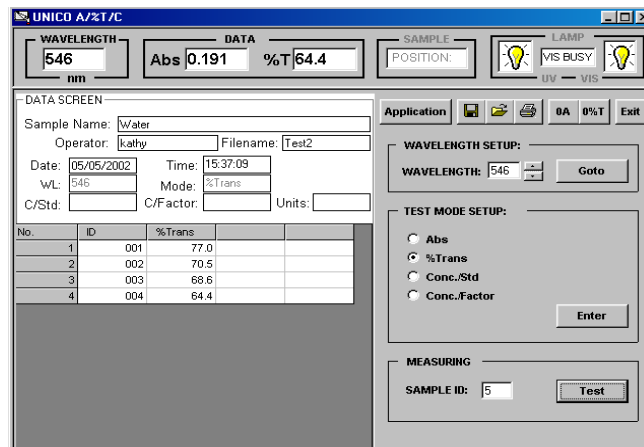Figure-19   Sample Test Results of **Abs Mode**

Figure-20   Sample Test Results of **%Trans Mode**

Concentration/Standard Mode
The purpose of this test is to determine the **Concentration** of the unknown samples by comparing the samples' **Absorbance/Transmittance** to that of the standard solution.

Repeat **Step 1** to **3** in **Absorbance/%Transmittance Mode** section.

Step 4A: Select the Test Mode: **Conc./Std**, type in the known concentration of the standard solution in the Text Field at the right of **Conc./Std** label, type in the unit in the Text Field at the right of the **UNITS** label.

Step 5A: Place the standard in the Sample Compartment and close the lid.

Step 6A: Click the **OK or Enter** button. This will measure the **Absorbance** of the standard and set its conversion **Factor** for measuring the unknown samples.
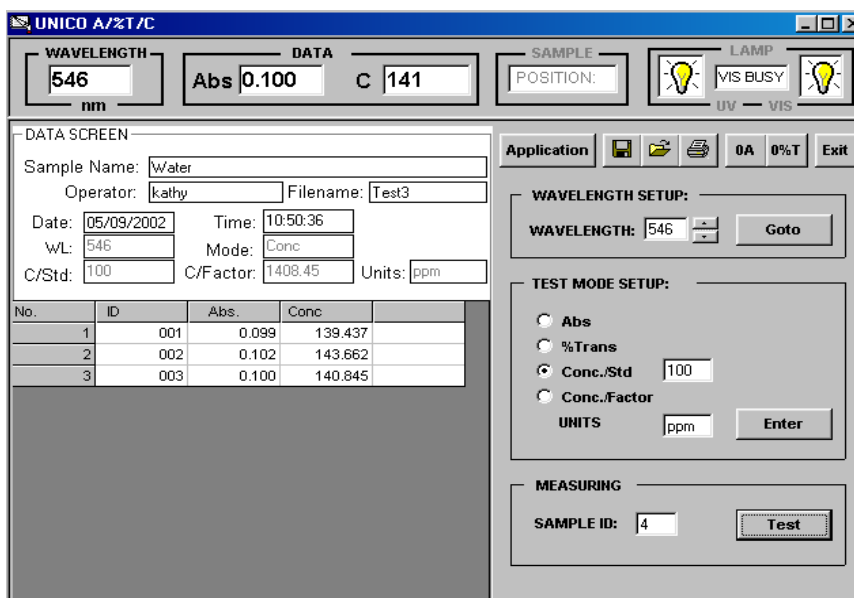

Figure-21 Test Results of **Concentration/Standard Mode**

Step 7A: Place your sample(s) in the Sample Compartment and click the **TEST** button for each sample to be measured. **Absorbance** and the **Concentration** of the samples will be displayed in the **Data Table** (Figure-21).

Concentration/Factor Mode

The purpose of this test is to measure the **Concentration** of the samples with known multiplication factor to calculate the **Concentration**.

Repeat **Step 1** to **3** in **Absorbance/%Transmittance Mode** section.

Step 4B: Select the Test Mode: **Conc./Factor**, type in the desired **Factor** in the Text Field at the right of **Conc./Factor** label, type in the unit in the Text Field at the right of the **UNIT** label (Figure-22 Factor Setting).

Step 5B: Place the samples into the Sample Compartment, close the lid, and click the **OK or Enter** button.

Step 6B: For each sample, be sure to place the sample in Sample Compartment and close the lid. Click the **TEST** Button to record results. The **Absorbance** and **Concentration** of the samples will be displayed in the **Data Table** (Figure-23).
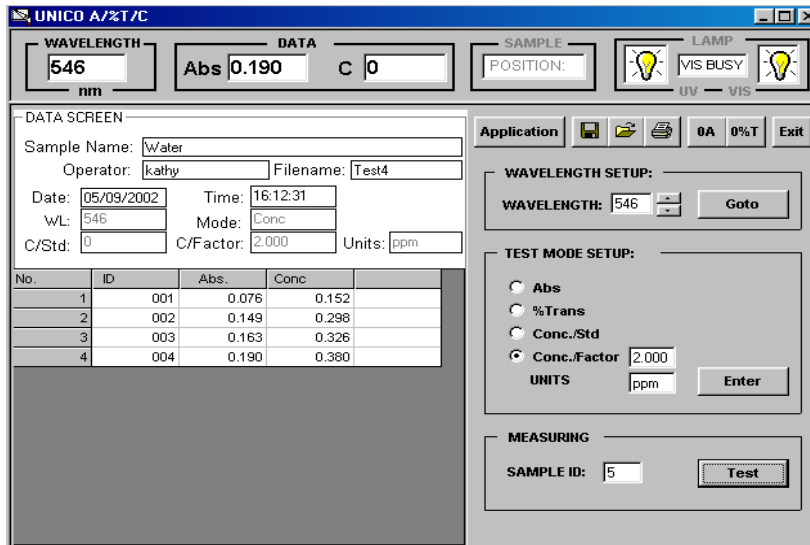

Figure-22   Factor Setting

Figure-23   Test Results of **Concentration/Factor Mode**

Standard Curve

The **Standard Curve** (Calibration Curve) method allows the operator to
• Measure up to 8 standards
• Calculate standard curves with 4 curve fits, including:
  1. **Linear Thru Zero**: set the y-intercept equal to zero; therefore, the curve is forced through zero. Calculate and display the slope and **Correlation Coefficient**.

  2. **Linear Squares**: Linear regression model. Calculate and display the slope, y-intercept, and **Correlation Coefficient** for the given standards.

  3. **2ⁿᵈ Order**: second derivative of the **Linear Squares** model. Calculate and display the coefficients. This method is used for non-linear standard curves or curves with a **Correlation Coefficient** of less than 0.9.

  4. **Segmented**: straight line. Use the standards as nodes to connect each point. No data is displayed or calculated.

• Select and view existing standard curves
• Calculate the **Concentrations** of unknown samples

Main Screen of Standard Curve
At the **Main Screen**, click **Application**, check **Standard Curve**, and click **OK** button to enter the **Main Screen of Standard Curve**

(Figure-24). Type **Sample Name**, **Operator** (name), **Filename**, and **Date** into the appropriate text fields.

Figure-24   **Main Screen of Standard Curve**

Figure-25   Sample Test Results of **Standard Curve**

The following are the basic operation procedures.

Step 1: Insert **reference** cuvette or nothing into the Sample Compartment and close the lid.

Step 2: Select the desired **wavelength** by clicking [button] button on the PC screen to set or typing in the desired **wavelength**, click **Goto** button at the right of [button] button to set the wavelength.

Step 3: Click on **0A** button to **blank** the reference.

Step 4: Under **Standard Setup**, at the right of **SAMPLES** label, click [button] button and set the number of standards (from 2 to 8) to be used.

Step 5: Type the units to be displayed at the text field of **UNITS** label.

Step 6: Place the standards in the Sample Compartment in order of lowest concentration to highest concentration. Type the concentration of the standards (e.g. 0.09 here) into the Text Field starting below **C/Std** label. Press **Enter** key on your computer keyboard or click with the mouse to move to the next cell. Repeat the same operation until all concentrations of the standards have been entered (Figure-25).

Step 7: Measure the **Absorbance** of each standard. For each measurement, insert the standard into Sample Compartment and double click in the appropriate **Absorbance** cell (**Abs**) next to the standard **C/Std** or type in the current Abs display from **Test Status Display** to get the **Absorbance** for curve drawing. Continue until all of the standards have been measured.

Step 8: Press the **Draw** button to graph the **Standard Curve** (Figure-26). You may **save** it for future use.
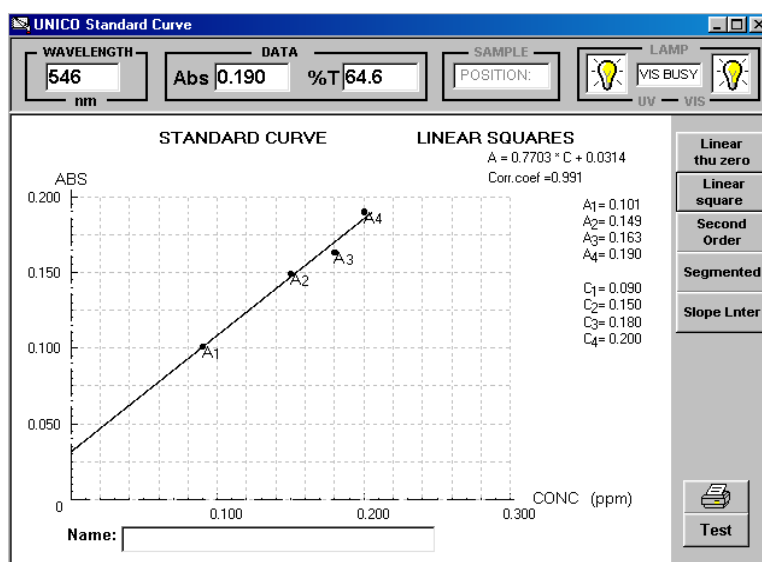

Figure-26   **Standard Curve** Graphic Display

Your standards have now completed setup. To use the graph and measure the unknown sample concentrations, please be guided by the steps below:

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Step 1: Select the desired **Standard Curve** by clicking on one of the five buttons (Figure-27). Shown in Figure-41 is **Linear Squares** (Least Squares Method). Items in the equation next to the **Linear Squares** title on the graph are Abs, the slope, and y-intercept as well as **Correlation Coefficient.**

        Abs = slope * C + y-intercept
        Corr. Coef = Correlation Coefficient

Step 2: (optional) Click **Print** icon button: print the graph and labels of the slope, y-intercept and Correlation Coefficient as seen on the screen.

Step 3: When ready to measure samples of unknown concentration, press the **Test** button to return to the main Standard Curve screen.

Step 4: To measure the concentration of unknowns, place the samples in the Sample Compartment and click on **Test** button, located at the bottom-left portion of the screen.

Step 5: To save the data with the **Standard Curve** fit selected, click on the ⊞ (Save Icon), name the file, and click **Save**.
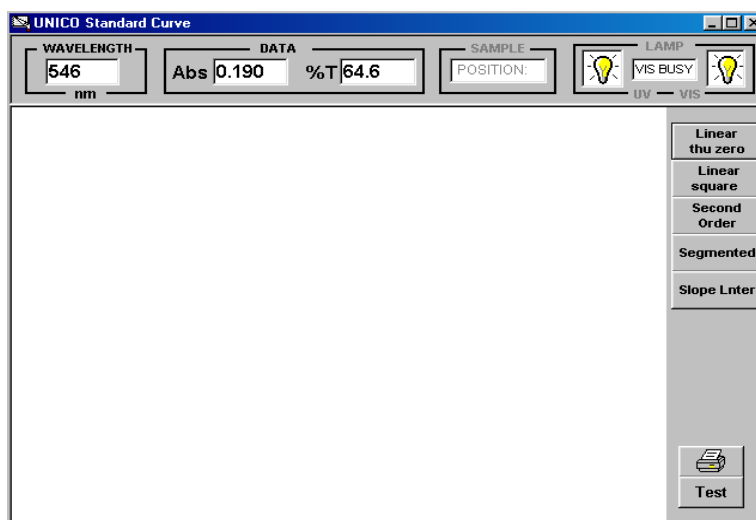

Figure-27   The Five Function Buttons of **Standard Curve**

Kinetics

The **Kinetics** application has the following functions:
- Setup kinetics Test Parameters
- Obtain kinetics data for a sample at a single wavelength
- Load and save data files for further studies

Main Screen of Kinetics
At the **Main Screen**, click **Application**, check **Kinetics**, and click **OK** button to enter the **Main Screen of Kinetics**. Type **Sample Name**, **Operator** (name), **Filename**, and **Date** into the appropriate text fields (Figure-28).

The following are the basic operation procedures.

Step 1: Insert **reference** cuvette or nothing into the Sample Compartment and close the lid.

Step 2: Select the desired **wavelength** by clicking [icon] button on the PC screen to set or typing in the desired **wavelength**, click **Goto** button at the right of [icon] button to set the wavelength.

Step 3: Click on **0A** button to **blank** the reference.

Step 4: Set the **TEST SETUPS** (**Step 4**~**Step 8**). Set the Total Run Time by typing into the Text Field on the right of the **TOTAL RUN TIME** label. The three blocks represent hour, minute, and second respectively.
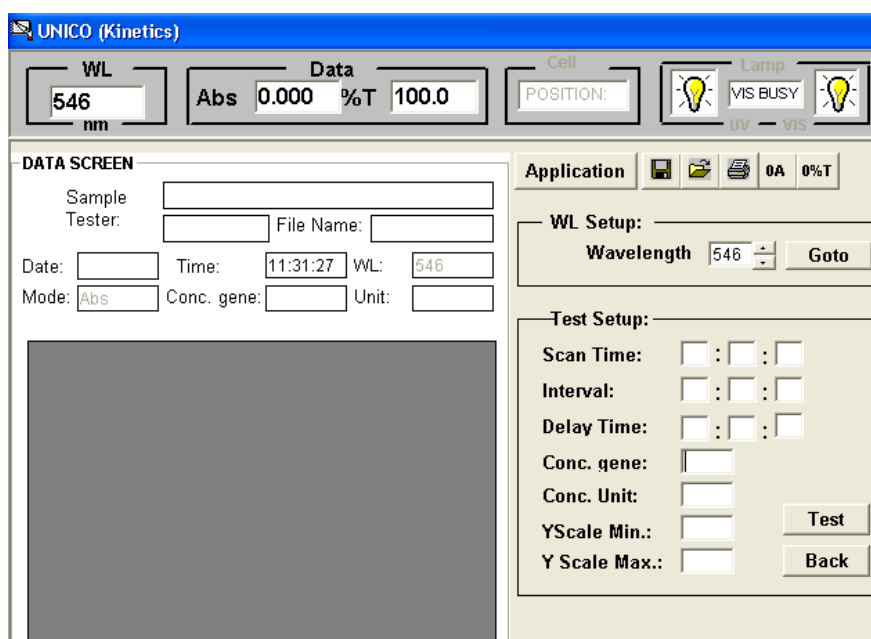

Figure-28   **Kinetics** Main Screen

Step 5: Set **INTERVAL TIME** similar as **Step 4**. This is the time interval for which measurements will be recorded (i.e. every 10 s, or every 3 s, etc.).

Step 6: Set an **INITIAL DELAY** similar as **Step 4**. The purpose of this step is to delay the beginning of data collection. (i.e. Sample must be injected, and reaction will not begin for 20 s).

Step 7: Set a **FACTOR** (multiplication factor--dilution factor) similar as **Step 4**. This allows for a factor to be used when calculating the **Concentration** of the solution.

Step 8: Set the **HIGH** and **LOW** Limits of the graph similar as **Step 4**. This is the selection of the minimum and maximum **Absorbance** range for the graph of the data.

Step 9: Type the unit in the Text Field at the right of the **UNITS** label.
Place your sample in the and click the **TEST** button once all the **TEST SETUPS** have been set and you are ready to start your measurement

Step 10: Click **Start** button to begin test (You may type the name of the Kinetics test in the text field at the right of the Name label, like "Water" of this sample test, see Figure-28). The test result is shown in Figure-30.

Start button**:** start the **Kinetics** test (Figure-29)
Stop button**:** stop the data collection at any given moment
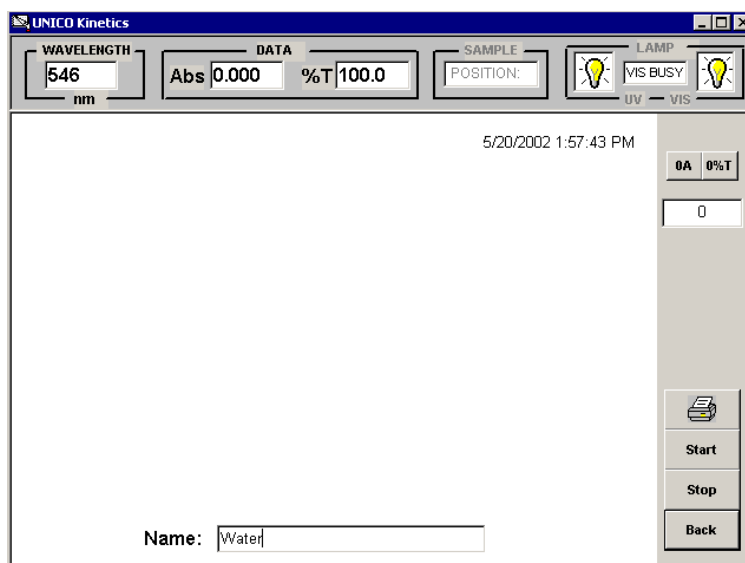**Back** button**:** go back to the **Kinetics** Test Display Screen

Figure-29　　　　Three Function Buttons for **Kinetics** Test
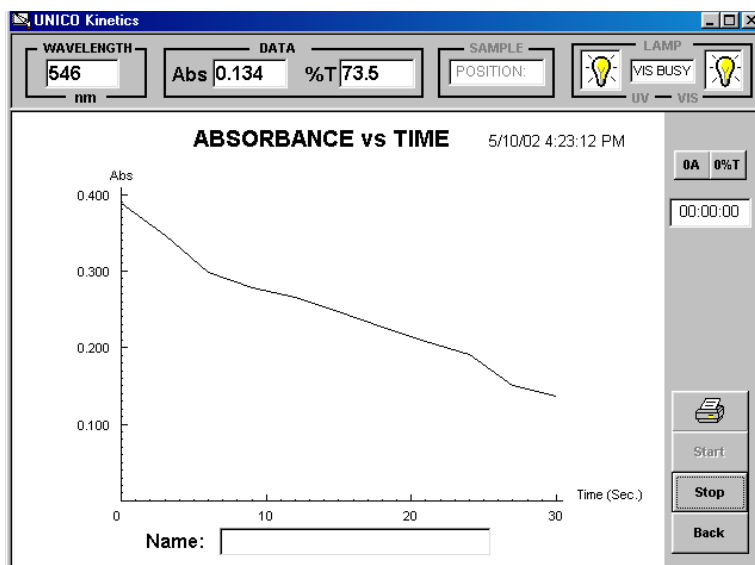
Figure-30 Test Results of **Kinetics**

Scanning

The **Scanning** application has the following functions:
- Select a data scan mode (Abs. or %T)
- Set the scale for the spectrum
- Set the scanning wavelength range
- Zoom function and Peak/Valley pick function
- Print, save and load data files

Main Screen of Scanning
At the **Main Screen**, click **Application**, check **Sample Scan**, and click **OK** button to enter the **Main Screen of Scanning** with a pop up window for **Scan Setup** (Figure-31 and Figure-34).
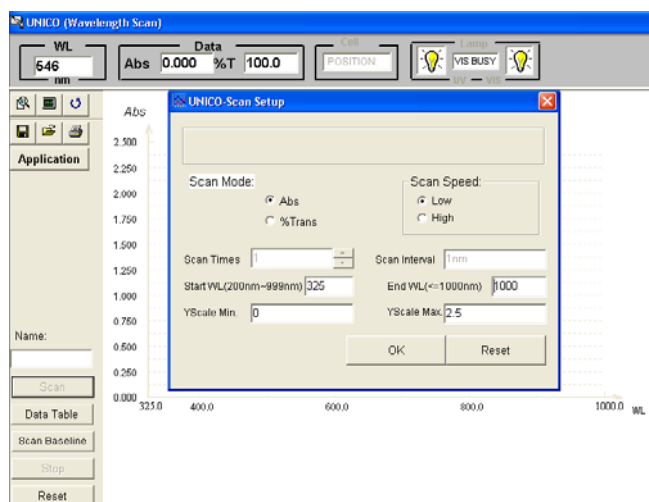
Figure-31   Main Screen of **Scanning**

Buttons of Scanning
The Scanning function has two button groups to run the application: **General Button Group** and **Scan Button Group** (Figure-32 and Figure-33).
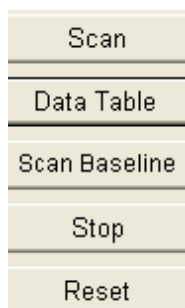

Figure-32   General Button Group

Figure-33   Scan Button Group

The **General Button Group** has six buttons:
- **Zoom** : to expand a section of the graph for easy viewing. **Operation**: Click the button, move the mouse to the upper left corner of the area desired to be enlarged in the graph; Click and hold the left-mouse

button and move the mouse to highlight the desired area with a dotted square, then release the mouse button; Click ↻ to return to the original graph

- **Peak/Valley** ▦ **:** to label peaks and valleys of the graph for presentation and notes. **Operation**: To **place** the **Peak Label**, click the button, move the mouse to the top of the peak and left click the mouse. It will display the absorbance and wavelength. To **remove** the Peak label, left click the mouse on the displayed absorbance and wavelength. To **place and remove** the **Valley label**, repeat the operation above with **right click the mouse**. You can also input a number to get the peak and valley value for certain range of the wavelength. For example, type 5 (it is actually 5 nm) (Figure-34), click **OK**, move mouse to the curve at 500 nm, you will get the Peak and Valley value from 495 nm to 505 nm.

- **Reset** ↻ : to return to the original graph from **Zoom** operation and **Peak/Valley** operations.

- **Save**: to save the test data. **Operation**: click the button and save the file with extension .tst.

- **Load**: to open the saved .tst file. **Operation**: click the button, browse the .tst file and open it with a mouse click.

- **Print**: to print the graph. **Operation**: click the button, the scanned graph will be printed on the printer connected to your PC。

- **Application**: to switch between the four test methods.

The **Scan Button Group** has five buttons:

- **Scan**: to scan the sample and obtain the graph. **Operation**: after baseline scan, click the button to scan the sample.

- **Data Table**: to store the scanned data dynamically. **Operation**: click the button, the Data Table will pop up.

- **Scan Baseline**: to set the baseline for the scan. **Operation**: click the button to begin baseline scan.

- **Stop**: to stop the scan. **Operation**: click the button to stop any current scan.
- **Reset**: to reset the scan parameters. **Operation**: click the button to reset the scan parameters at the end of each scan or any time you stop the scan.
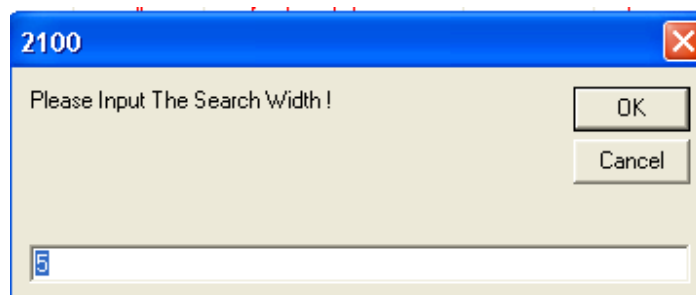
Figure-34   Peak and Valley Search within Certain Wavelength Range

Scan Sample
Before scan, you must setup the following scan parameters:
1. Scan Mode
2. Scan Scale
3. Scan Wavelength Range

The Scan Interval is preset at 1 nm default. The followings are the basic operation procedures.

Step 1: Insert **reference** cuvette into the Sample Compartment and close the lid.
Step 2: At the **Main Screen of Scanning**, select **Scan Mode** (**Abs or %Trans**) and
           Scan Speed at the pop up **Scan Setup** window (Figure-35).
Step 3: Set the **Scan Scale**. **Abs** is 0 to 2.5A. %Trans is 0 to 125.
Step 4: Select the **Scan Wavelength Range**. Input Start WL and End WL at the
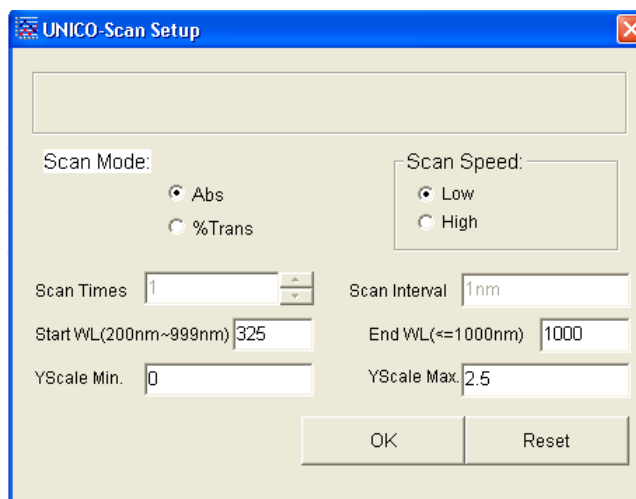   appropriate test fields, then click **OK** button.

Figure-35   Scan Parameter Setup

Step 5:   **Baseline Scan**. Click **Scan Baseline** button at the **Scan Button Group** tool
            bar. The **Scan Baseline** window will pop up. Retype the Start and End
            wavelength you just input at **Step 4** into the appropriate text fields to reconfirm

the wavelength range selection. Click **Scan** button to start the Baseline Scan process (Figure-36).

Warning: Enter different Start WL or End WL may cause malfunction!
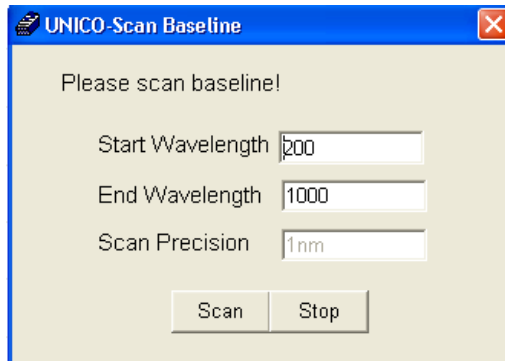

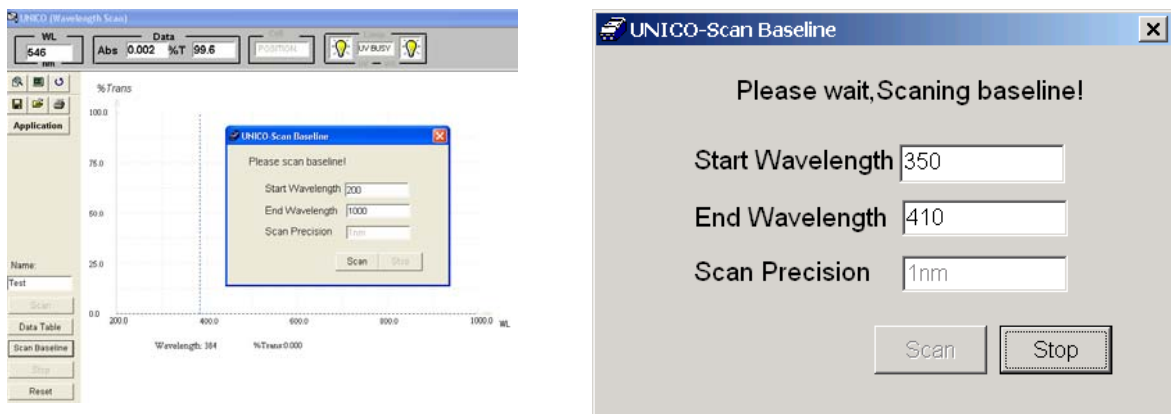Figure-36   Scan Baseline Setup

Figure-37   Scan Baseline Start-up and in Progress

Step 6:   **Sample Scan**. After the Baseline Scan is finished (Figure-38), remove the reference and insert the sample into the sample holder. Click [Scan] button at the **Scan Button Group** tool bar to start scan sample. Figure-39 and Figure-40 shows the sample scan process, the data table, and the final graph of the scanning result.
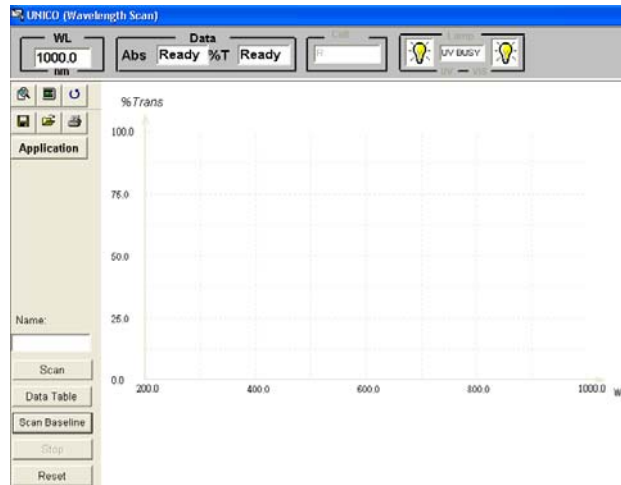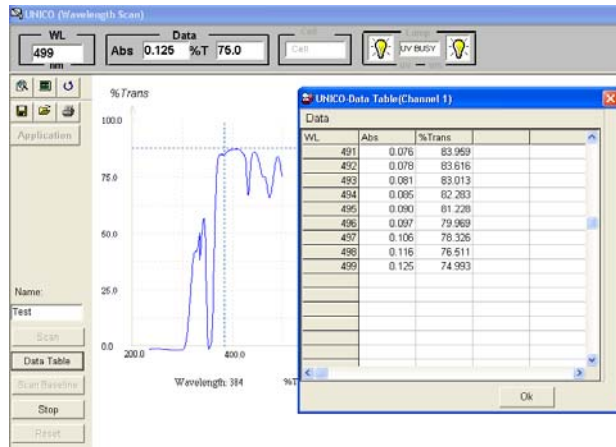
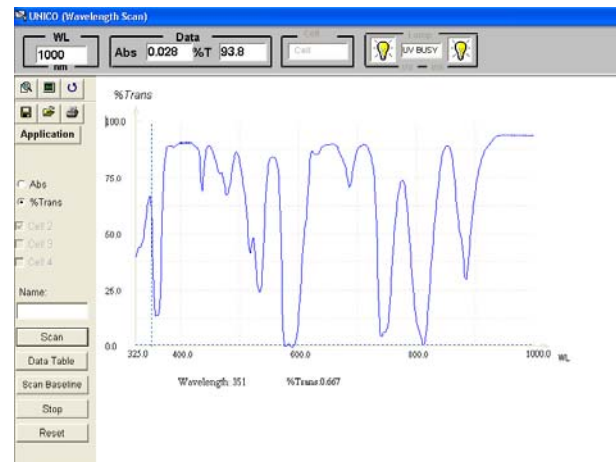Figure-38   Scan Baseline Complete

Figure-39   Scanning Sample

Figure-40   Sample Scan Complete

Note: After Sample Scanning is finished, if you want to continue to scan using current scan setting, just simply change the sample and click [Scan] button to begin the new sample scanning test. **If you want to change the scan setting**, please follow the instruction below, otherwise the spectrophotometer may not response:

1. Click [Reset] button at the Scan Button Group. At the **Scan Setup** pop up window, select **Scan Mode** and Scan **Speed**, set **Scan Scale**, and select **Wavelength Range**, then click **OK** button.

2. Retype the wavelength you choose at the **Scan Baseline** pop up window, click [Scan] at the pop up window.

3. After the screen shows **ready**, go to **Step 6** of the **Scan Sample** procedures.

To close the application, just close the test window and click **EXIT**, then **YES**.

Data import to Microsoft Excel®

By referring to the following steps, you can transfer any of the UNICO® Application Software—UNICO 2100 + test data to a Microsoft Excel® program**:**

Step 1: In Microsoft Excel, click on **File** and click **Open**.

Step 2: Select any saved file you wish to import.

Step 3: After the Excel Text Import Wizard appears, select **Delimited**, select the row from which you want the import to start, and click on the **Next** button as shown in Figure-41.

Step 4: Uncheck the **Tab** delimiter and select **Comma** delimiter as shown in Figure-42, then click the **Next** button.

Step 5: Click the **Finish** button and the test data will be imported into your Excel spreadsheet. Here, further calculations can be performed from the "raw" data collected.

Step 6: Save the imported file under a DIFFERENT FILE Name if you still want to keep and open the original **UNICO®** data file in **UNICO 2100 +**. Otherwise, the original **UNICO®** data file (.tst file) will be modified by the Excel® format during importing and the modified file cannot be opened from **UNICO 2100 +**.
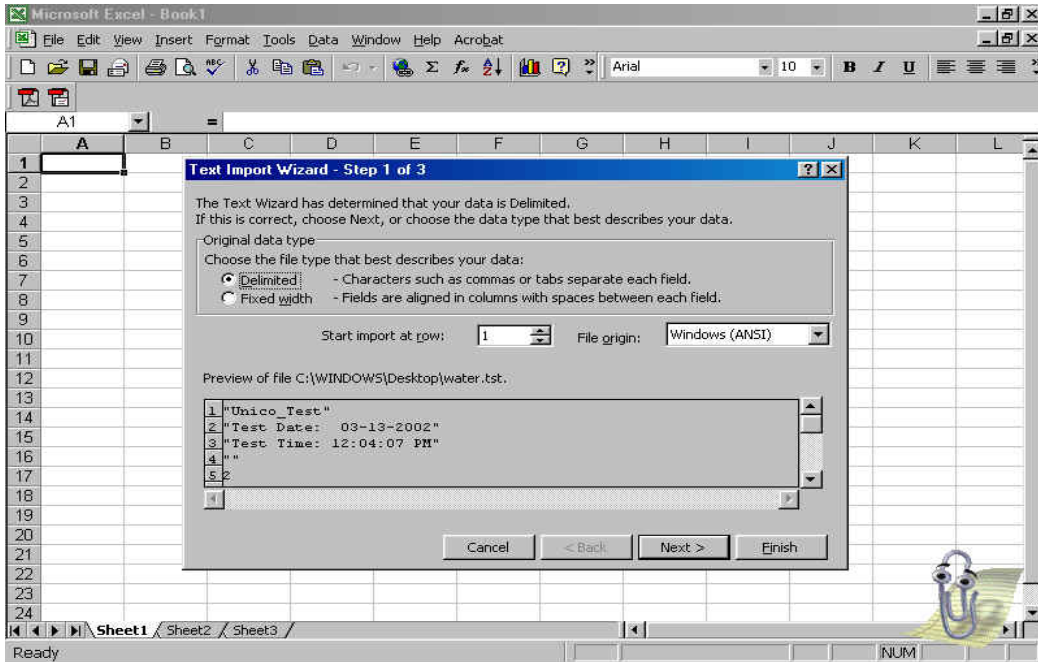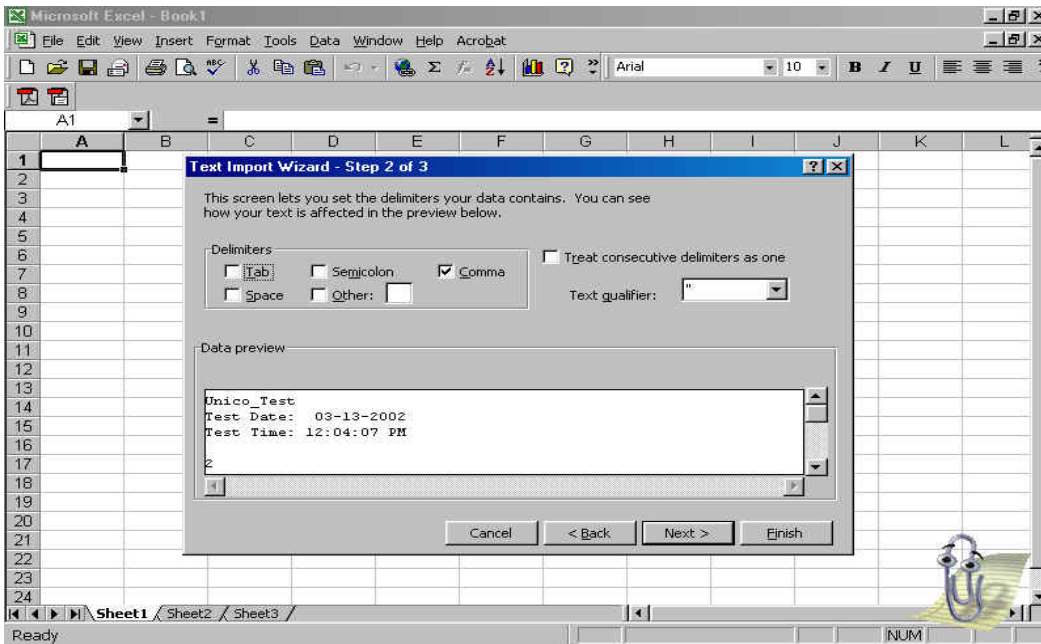
Figure-41   Excel Text Import Wizard

Figure-42   Excel Text

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