2100 SERIES
SPECTROPHOTOMETER
SOFTWARE USER'S MANUAL

Version SB-2.10

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Table of Contents

Introduction

The **UNICO® Application Software**--**2100** has been designed to operate with **UNICO® Spectrophotometer Model 2100 and 2100UV**. The software runs on a PC (personal computer) with Windows® 98 operating system installed. It can also be used in PC with Windows® 95, Windows® NT, Windows® 2000 Professional, and Windows® XP.

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

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**) 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.

Minimum Computer Requirements

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

PC with:
- 16MB RAM
- Pentium or faster processor
- 10 MB of free space on memory
- VGA Color Monitor
- PS/2 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. If the software can show the **Automatic Setup Screen** as Figure-1, go to **Step 4**. If it can not, go to **Step 2**.

Step 2: Double click **My Computer** icon of your PC and locate the CD Drive as Figure-2 indicates.

Step 3: Right click the CD Drive Label and click **Open** as shown in Figure-3

Step 4: Click **setup.exe** as Figure-4 shown or click **SETUP** shown in Figure-1

Step 5: The **Setup Screen** (Figure-5) will then display a "Welcome" message reminding you to close any open programs. If all programs are closed, then click **OK** and go to **Step 6**. If other programs are open and operating, click **Exit Setup**, close the open programs and return to **Step 2**.

Step 6: Choose the Directory and **Program Group** where you want the software to be installed as shown in Figure-6 and Figure-7. The **File Setup Directory 1** (Figure-6) will then appear. If the File Path selection is OK, then go to **Step 7**.

NOTE: if you wish to change the location of the installation, then click **Change Directory** and specify the desired directory. If you are unsure and need to examine your computer files, click on **Exit Setup** and go to Windows® Explorer to make sure no duplication or improper storage of the files will occur.

Setp 7: Click the **Install** Icon (Figure-8) to start **2100** installation, click **Continue** to finish the installation.

Step 8: Wait for the message stating the software was installed successfully as shown in Figure-9. Click **OK**, re-start your PC.

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

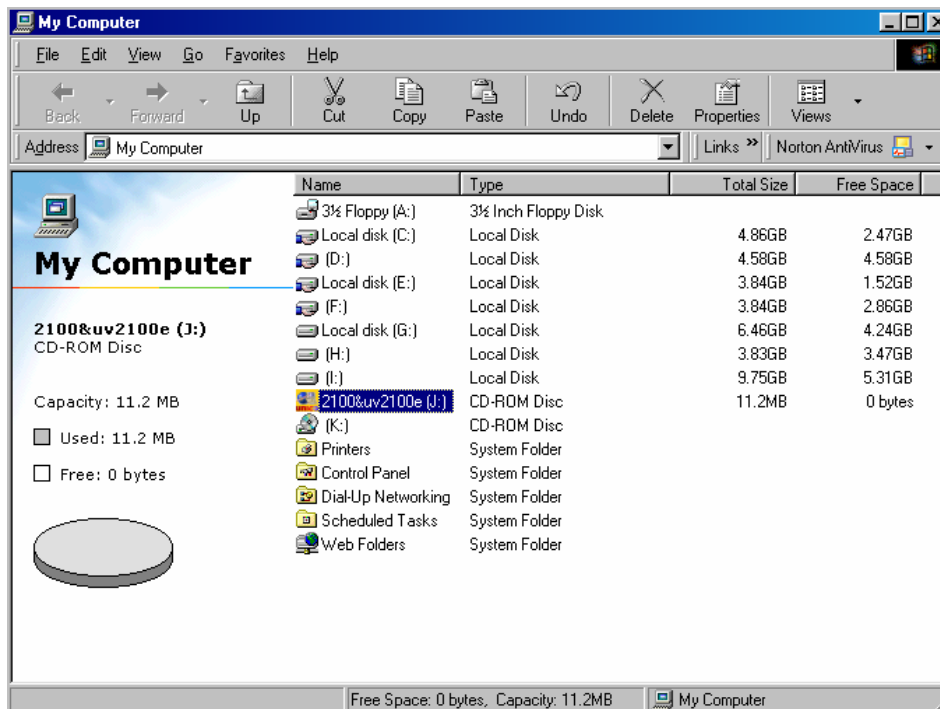Figure-1   Automatic Setup Screen

Figure-2   Locate CD Drive Screen
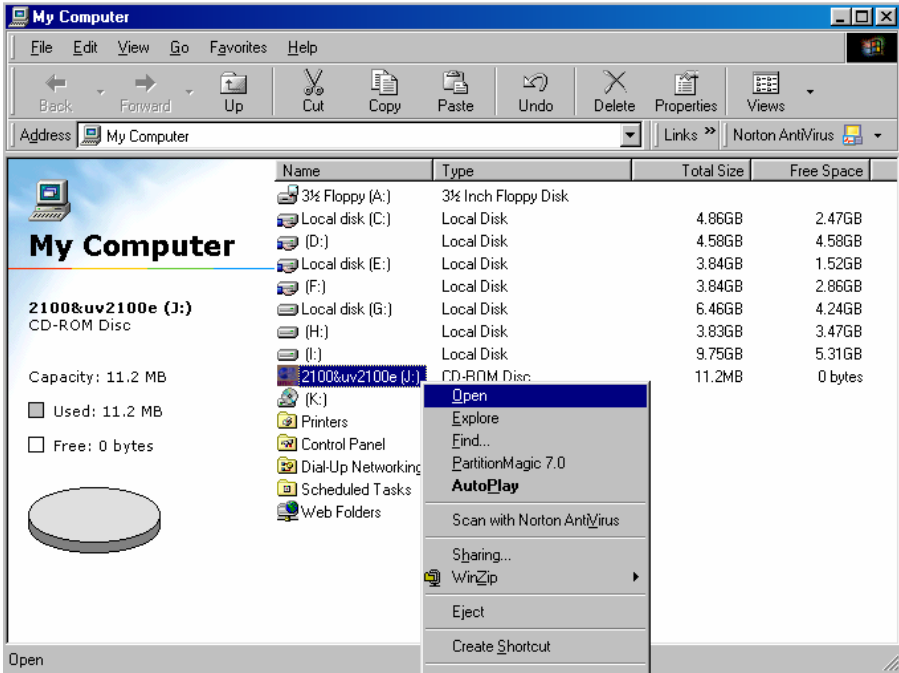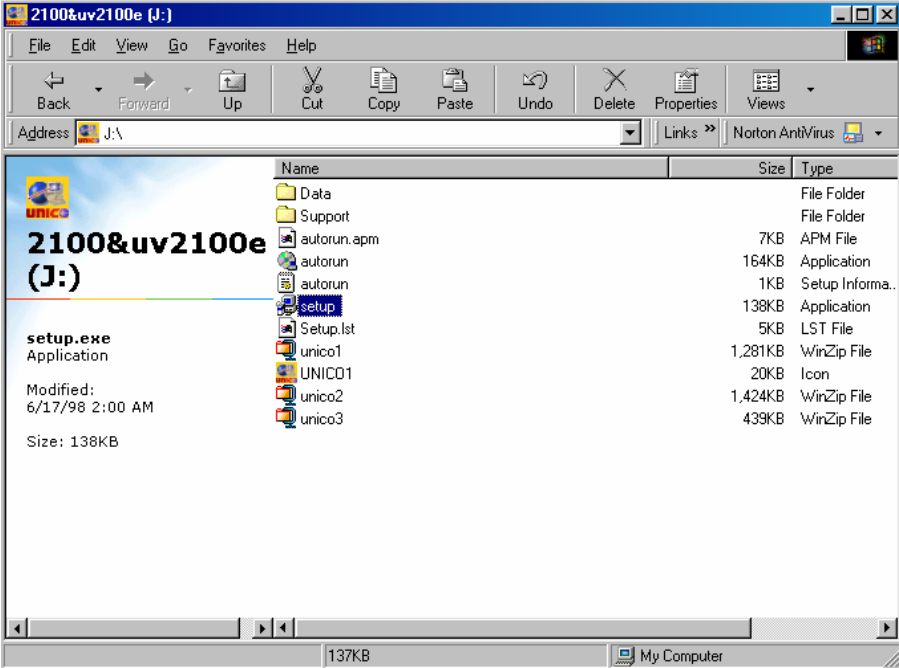
5

Figure-3   Open CD Drive

Figure-4   Click "setup.exe"
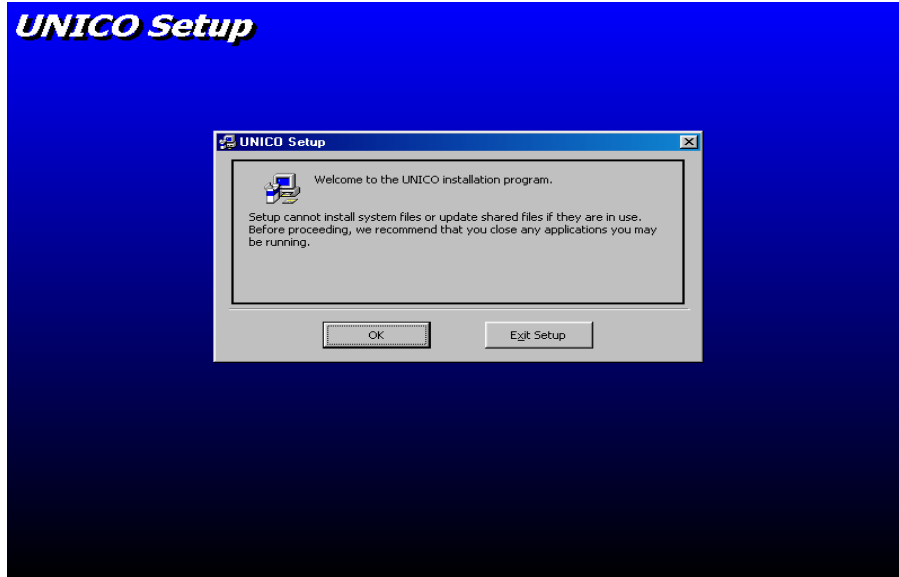
Figure-5   Setup Screen
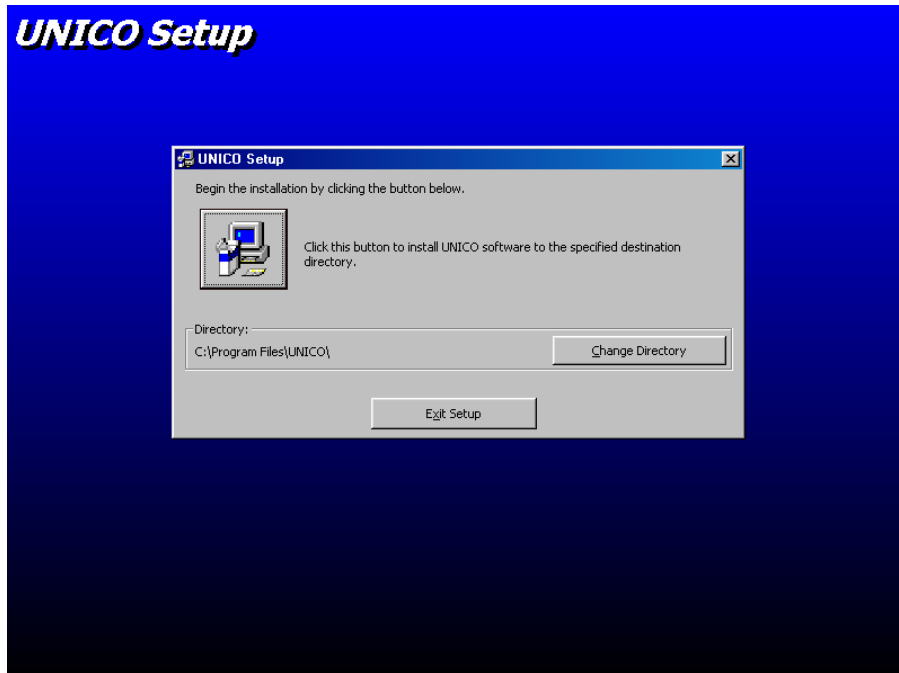

Figure-6   File Setup Directory Selection I
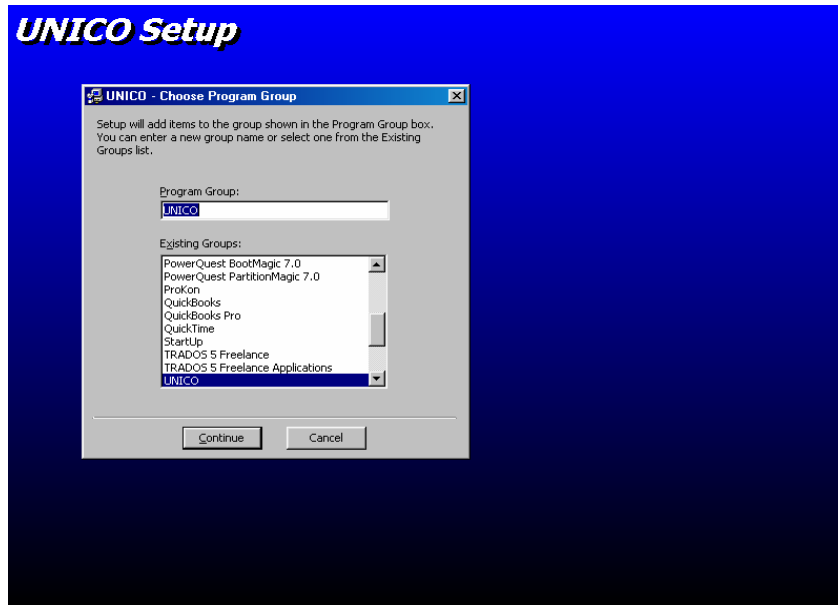
7

Figure-7   File Setup Directory Selection II

Figure-8   Install Icon

Figure-9   Installation Success

Connecting Computer to Spectrophotometer

Step 1: Remove the RS232 Connection Cable (double end) out of the bag.

Step 2: Locate the RS-232C port on the back of your PC. Connect the female 9-pin (small) connector (one end of the Connection Cable) to the male 9-pin of your PC and secure with the built-in screws. If your PC does not have a male 9-pin connection, use the male 25-pin connector.

ONLY USE The 25-pin connector if your PC does not have a male 9-pin connector (common for older, upgraded computers).

8

Step 3: Model **2100/2100UV** Spectrophotometer has a male 9-pin RS-232C port on the back. Connect the other end of the RS232 connection cable to your Model **2100/2100UV** and secure tightly.

Step 4: Turn on your PC (if not already on) and your Model **2100/2100UV** (if not already on, let it warm up for fifteen minutes).

Step 5: Click the **Start** button on your PC, scroll to **Programs**, **UNICO,** and locate the **UNICO** (Figure-10), and click it.

Step 6: The Start-up Screen of **2100** will appear as Figure-11 shown.

Step 7: Click , a window will pop-up as Figure-12.

Step 8: Press the **ENT** key on the Model **2100/2100UV** panel, select the proper port in the pop-up window, and then click **OK** on your Computer Screen. The **2100** will initialize and go to the main screen (Figure-13).
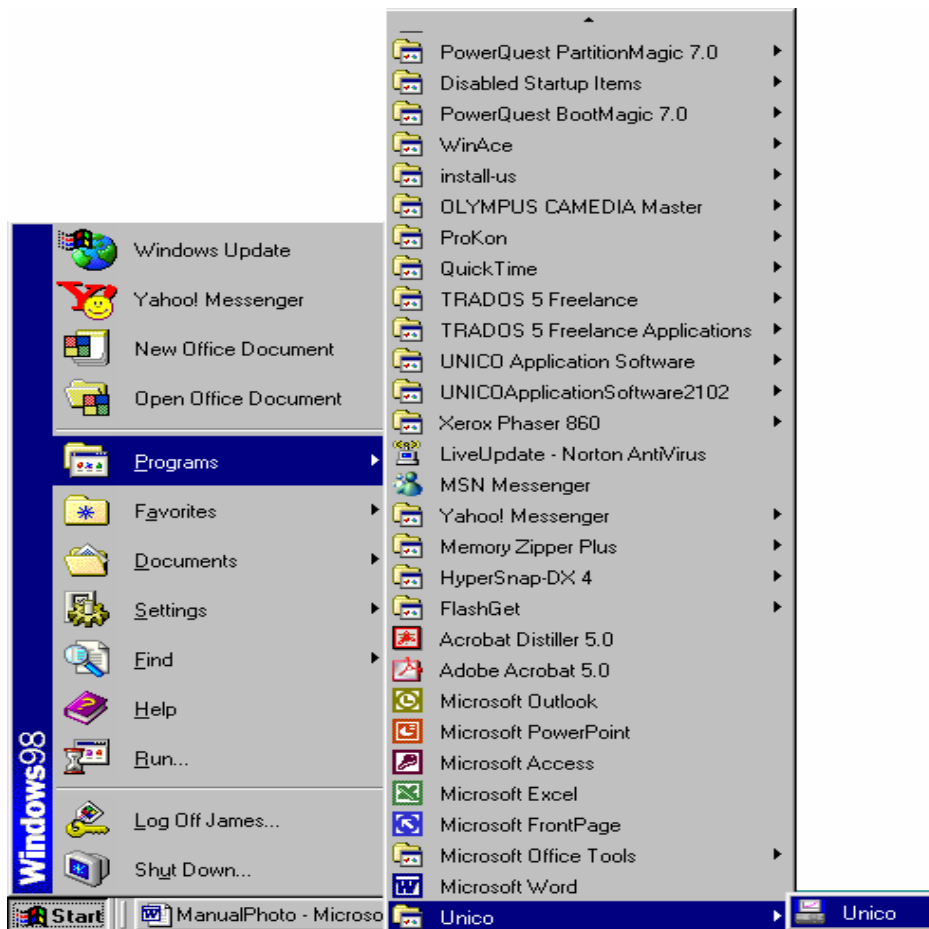

Figure-10   Open the Software
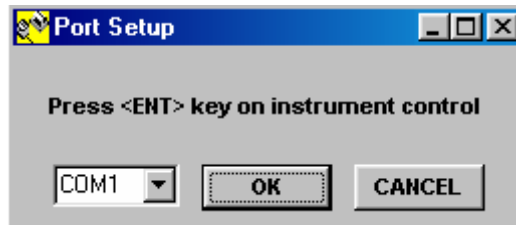
Figure-11 Start-up Screen
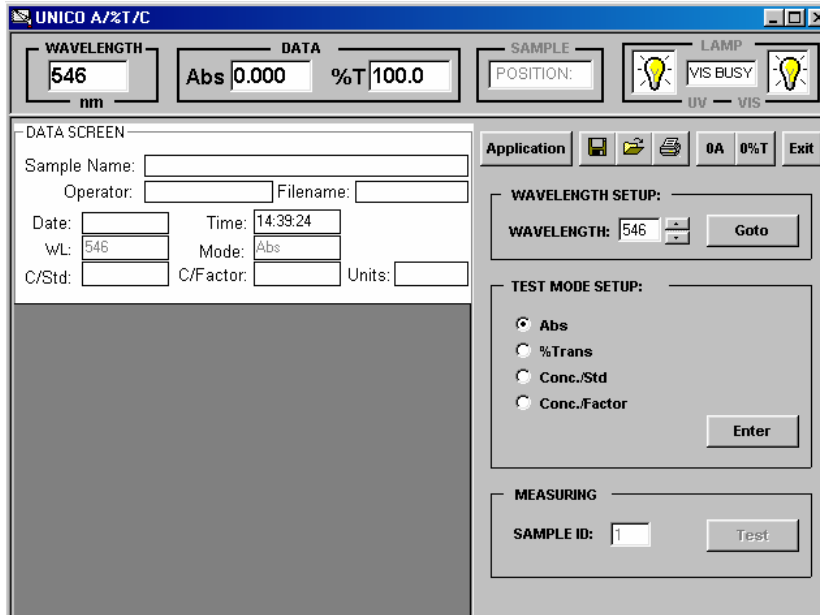

Figure-12   Port Selection

Figure-13 Main Screen Display

CAUTION: The %T/0Abs Display Screen will display as Figure-14 shown. The buttons on the Operation Panel of 2100 and 2100 UV (Figure-15) are functionless.
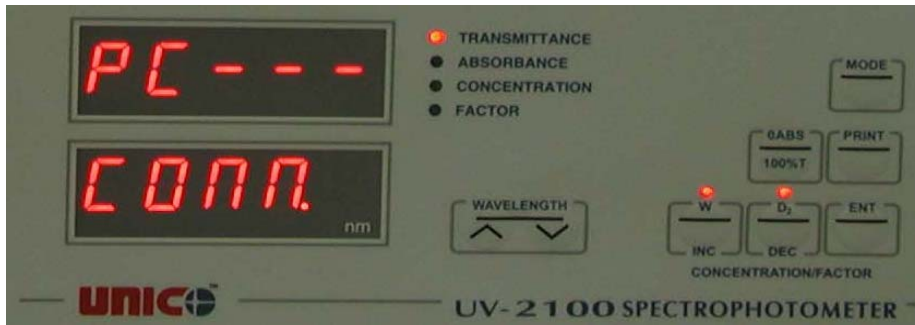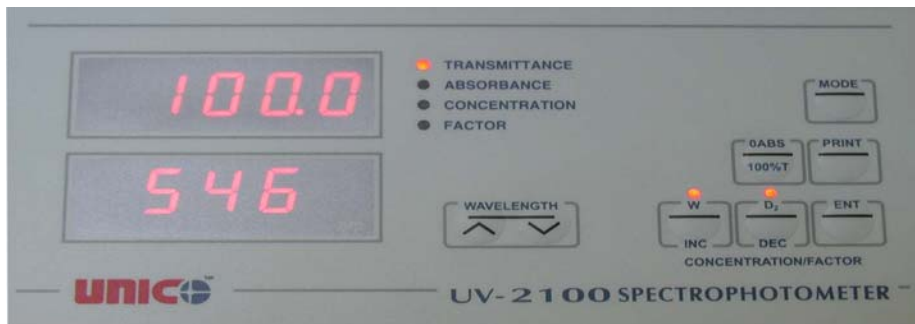

Figure-14   **PC CONN** Screen

Figure-15   **2100UV** Operation Panel

Main Screen Display

After your Model **2100/2100UV** is connected to your PC, and **2100** is running, your PC will show the **Main Screen Display** like Figure-13.

The **2100** Display Screen can be divided into three parts: **Data Screen** (Figure-14 Data Screen), **Test Status Display** (Figure-15 Test Status Display) and **Test Screen** (Figure-16 Test Screen).

Data 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

11

labels at their left, are set by **Test 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-14   Data Screen

Test Status Display
It shows the current status of the **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 (it is the future function)
- Text Field under **LAMP** shows the UV and VIS lamp status

Figure-15   Test Status Display

Test Screen
It has ten buttons/icon buttons:
- **Application** button: select the three test methods: **A/%T/Conc**, **Standard Curve**, **Kinetics** (Figure-17 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)
- **Exit** button: quit the **2100** and disconnect it from the spectrophotometer
- **GOTO** button: set the **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
- **Enter** button: select the test modes used: **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.
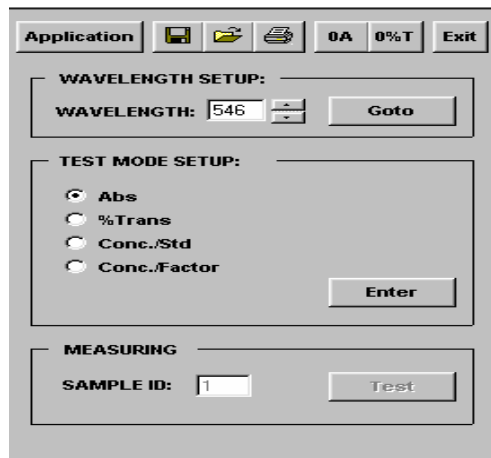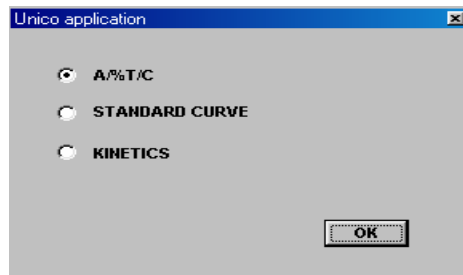

Figure-16   Test Screen

Figure-17   Test Methods

Basic Operation

Three **Analytical Methods--Absorbance/%Transmittance/Concentration**, **Standard Curve**, and **Absorbance vs. Time Kinetics** 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-17), and click **OK** button to enter the **Main Screen of A/%T/C** (Figure-18)**.** Type **Sample Name**, **Operator** (name), **Filename**, and **Date** into the appropriate text fields.
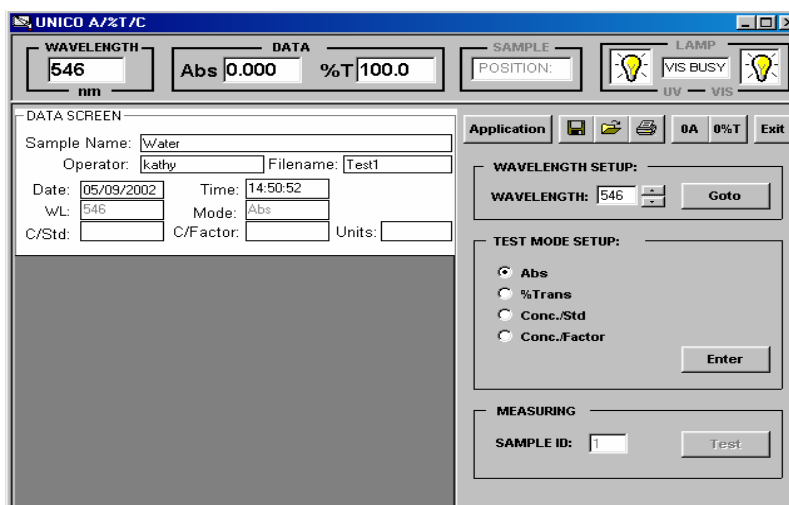

Figure-18   **Main Screen of A/%T/C**

➢ *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 on the PC screen to set or typing in the desired **wavelength**, click **Goto** button at the right of button to set the wavelength.

Step 3: Click on **0A** button to **blank** the reference (Figure-19).

Step 4: Select the test modes: **Abs** or **%Trans**, and press **Enter** button (Figure-20 Test Mode Selection)

14

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-21 and Figure-22.
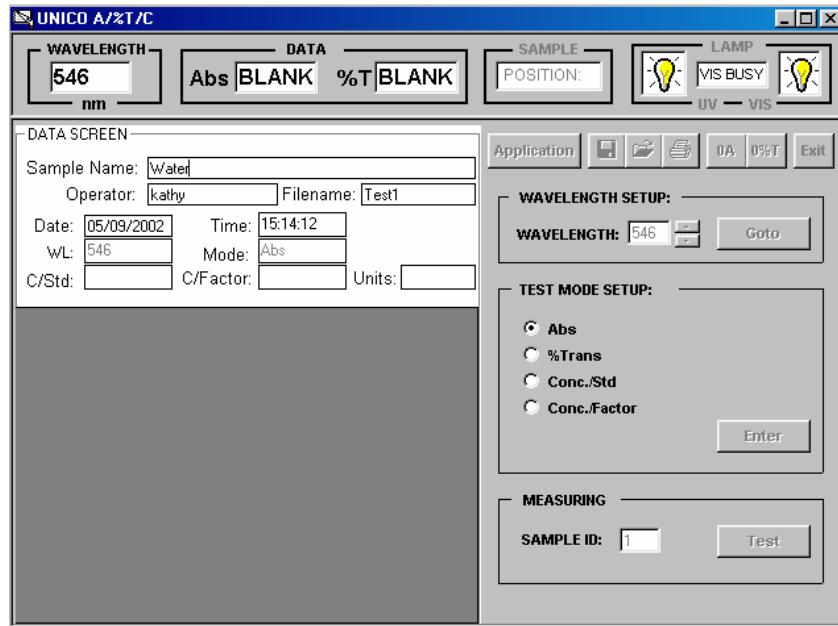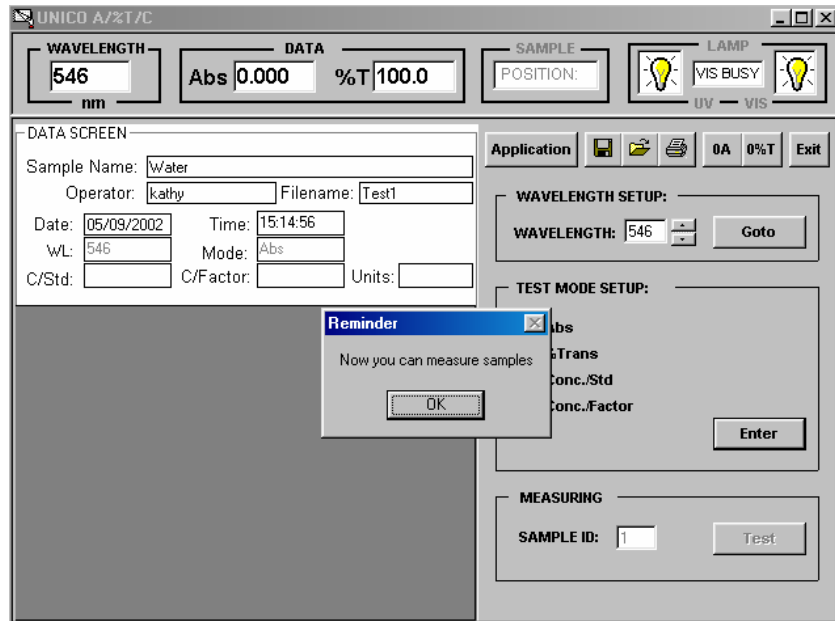

Figure-19   **0A** Blanking
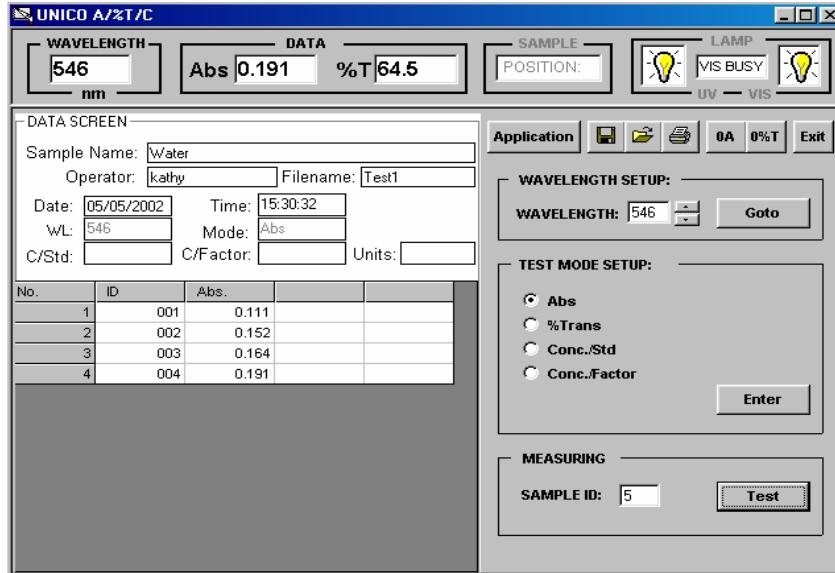
Figure-20   Test Mode Selection

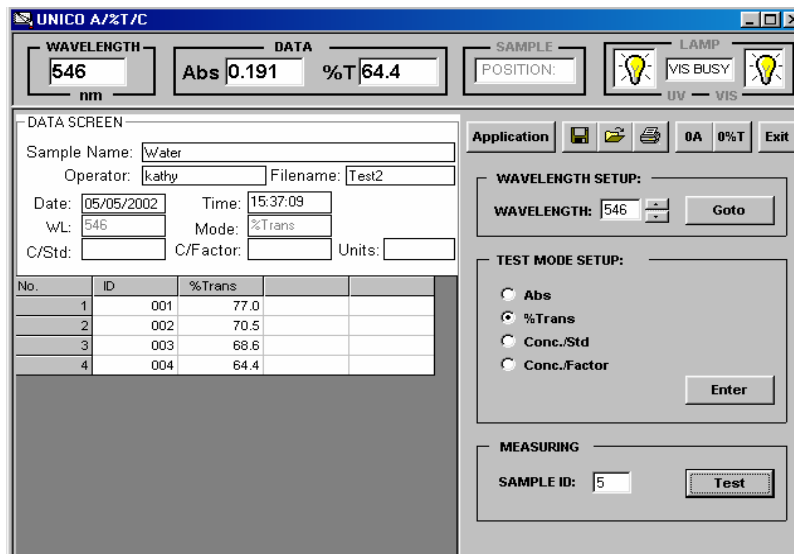Figure-21   Sample Test Results of **Abs Mode**

Figure-22   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 **Enter** button. This will measure the **Absorbance** of the standard and set its conversion **Factor** for measuring the unknown samples.
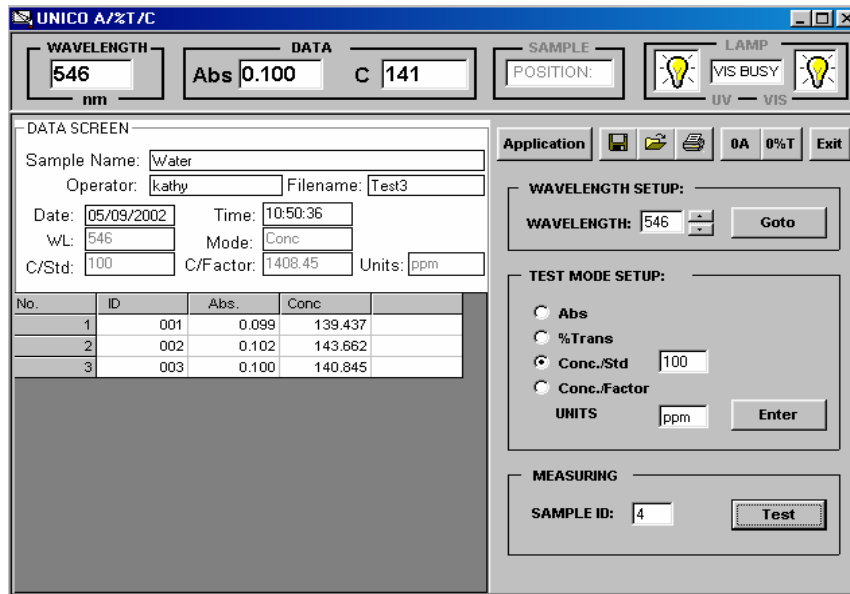

Figure-23   Sample Test Results of **Concentration/Standard Mode**

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-23).

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-24 Factor Setting).

Step 5B: Place the samples into the Sample Compartment, close the lid, and click the **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

17

Absorbance and **Concentration** of the samples will be displayed in the **Data Table** (Figure-25).
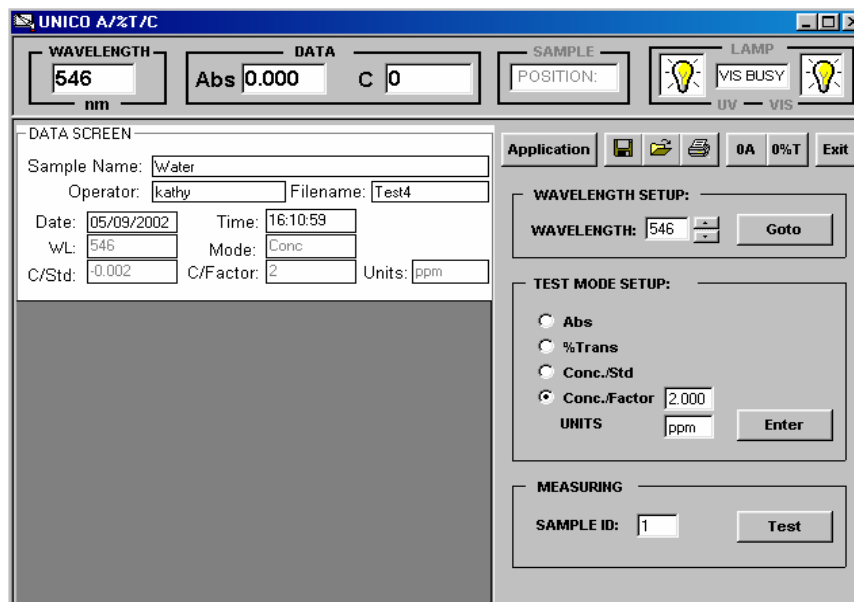

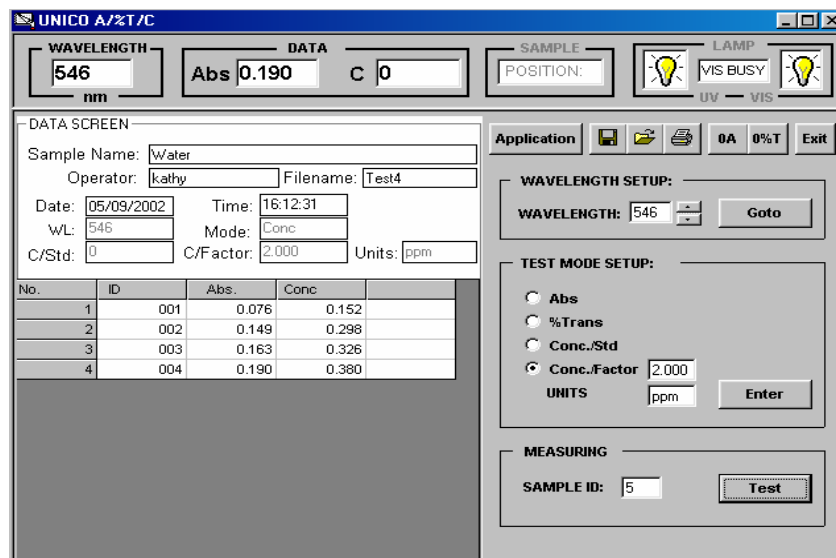Figure-24   Factor Setting

Figure-25   Sample 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:

18

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** (Figure-17), and click **OK** button to enter the **Main Screen of Standard Curve** (Figure-26)**.**
Type **Sample Name**, **Operator** (name), **Filename**, and **Date** into the appropriate text fields.
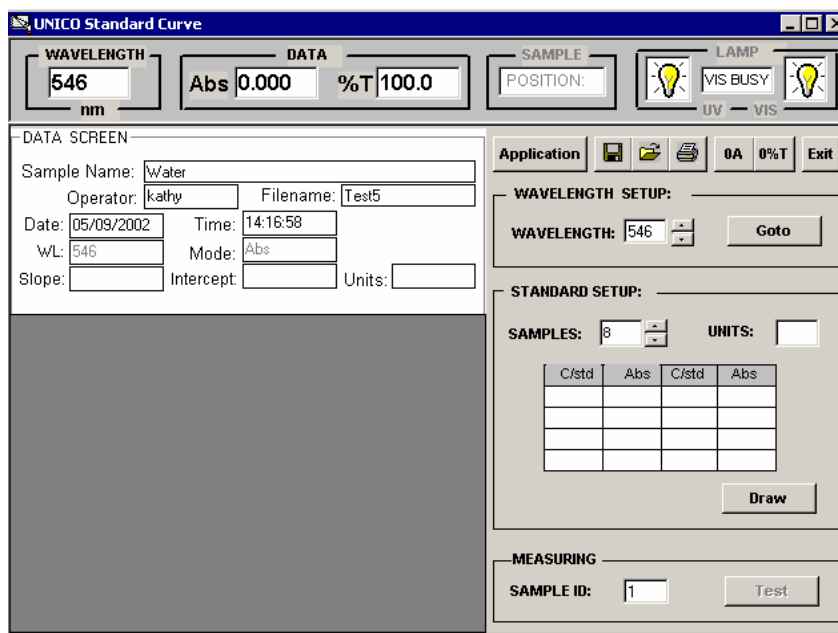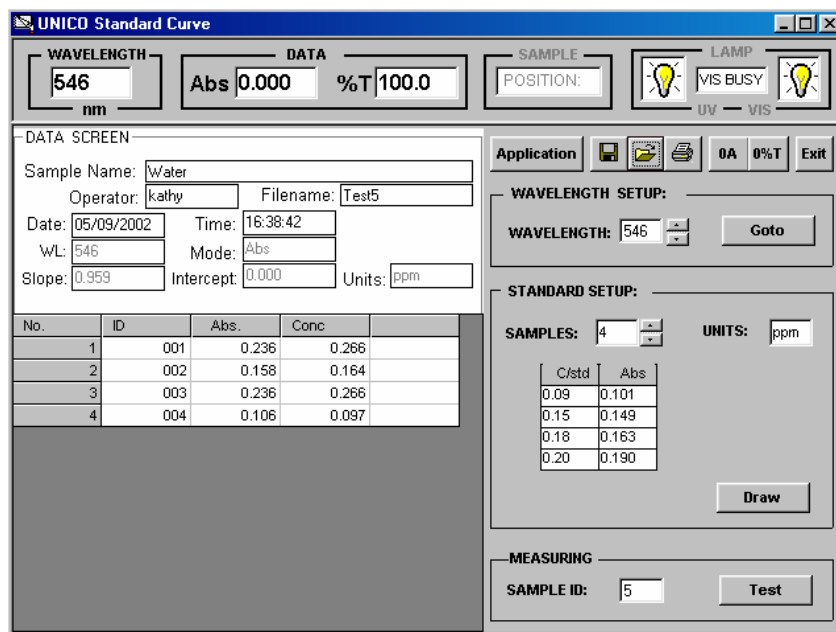

Figure-26   **Main Screen of Standard Curve**

Figure-27   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 on the PC screen to set or typing in the desired **wavelength**, click **Goto** button at the right

of [↑↓] 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 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-27).

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-28). You may **save** it for future use.
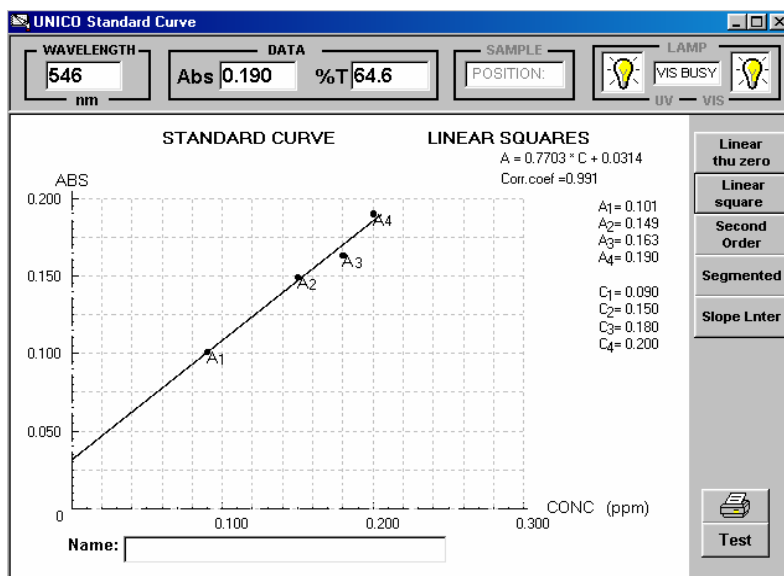

Figure-28   **Standard Curve** Graphic Display

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

Step 1:   Select the desired **Standard Curve** by clicking on one of the five buttons (Figure-29). Shown in Figure-28 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 (Figure-26).

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**.
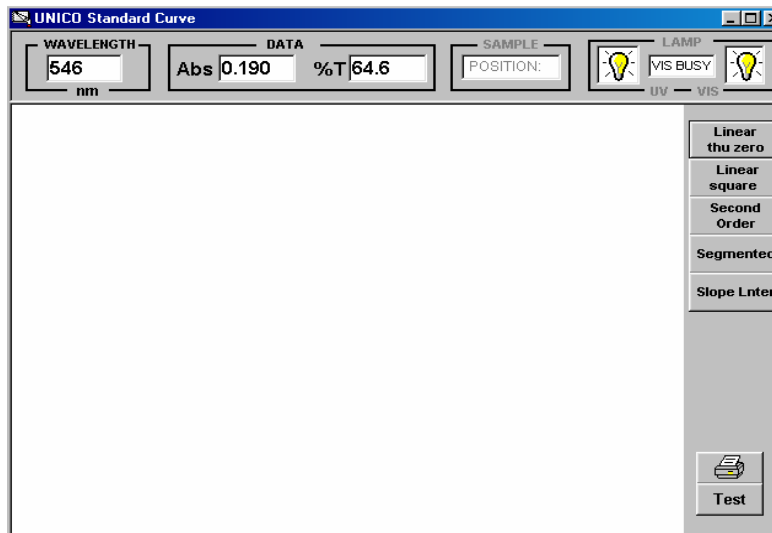

Figure-29   The Five Function Buttons of **Standard Curve**

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** (Figure-17), 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-30).

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 on the PC screen to set or typing in the desired **wavelength**, click **Goto** button at the right of 🔼🔽 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.
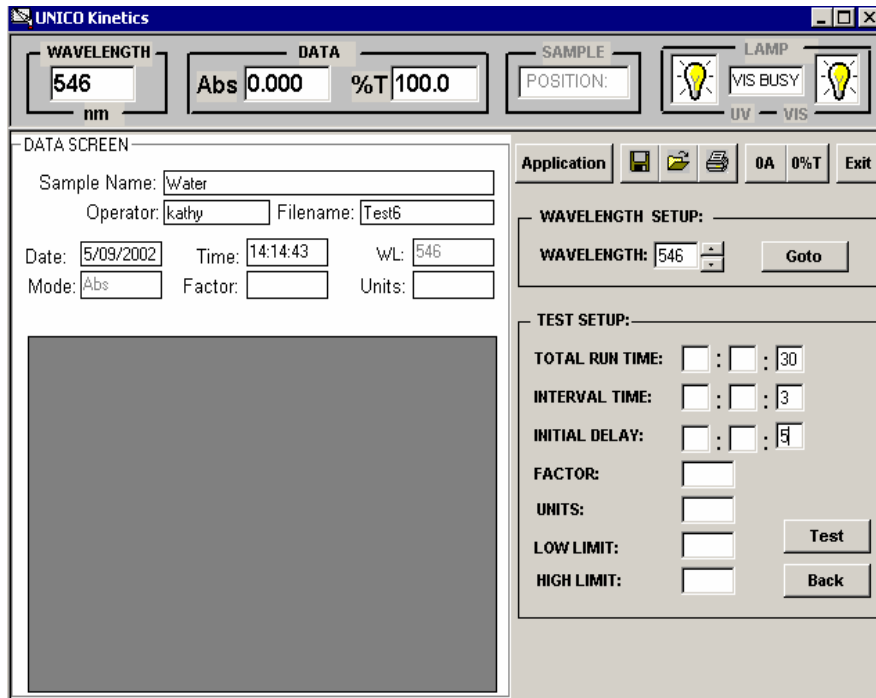
22

Figure-30   **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-31).

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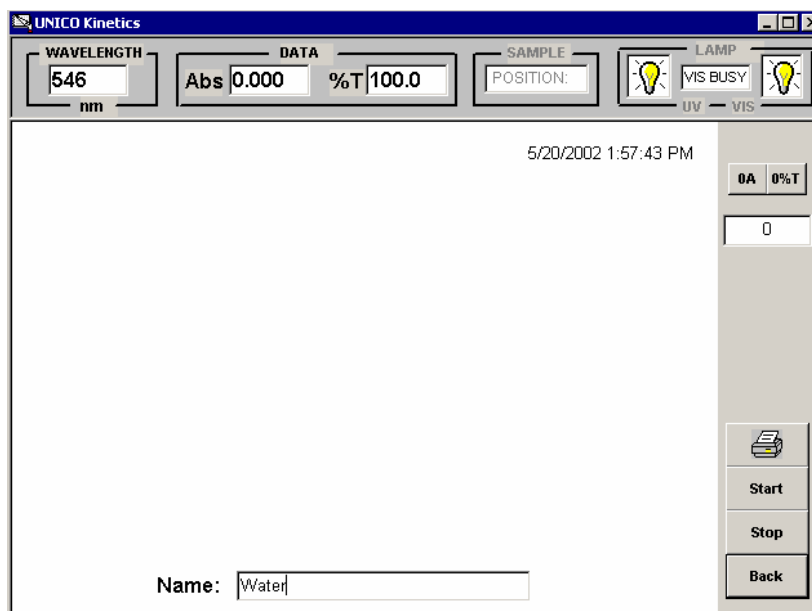**Back** button: go back to the **Kinetics** Test Display Screen

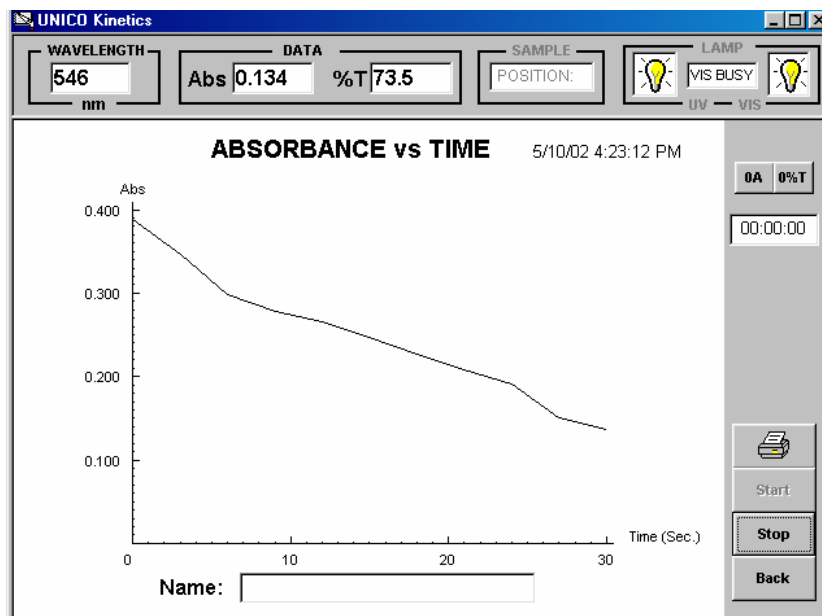Figure-31   Three Function Buttons for **Kinetics** Test

Figure-32   Sample Test Results of **Kinetics**

Data import to Microsoft Excel®

**By referring to the following steps, you can transfer any of the UNICO®
Application Software—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
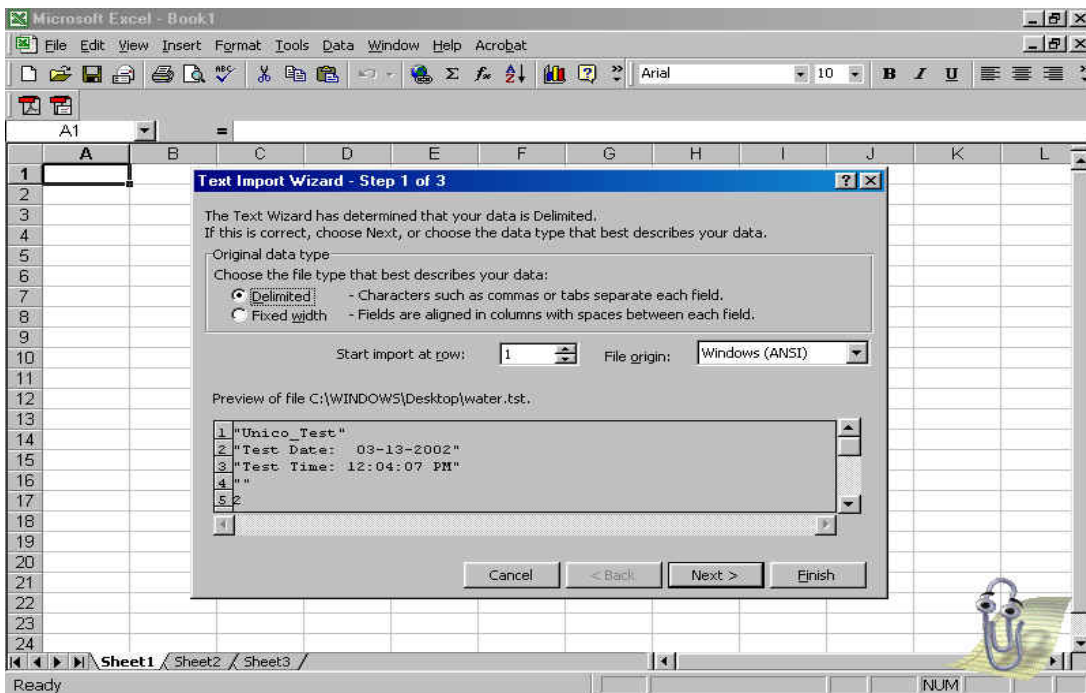shown in Figure-33.

Figure-33   Excel Text Import Wizard I

Step 4: Uncheck the **Tab** delimiter and select **Comma** delimiter as shown in Figure-34, then click the **Next** button.
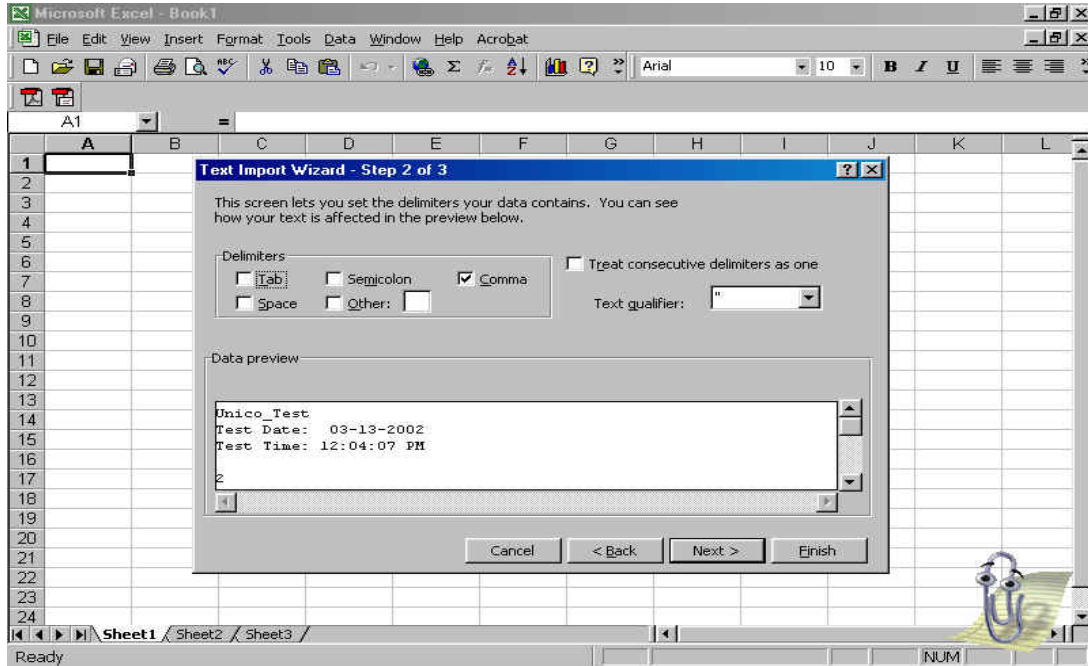

Figure-34   Excel Text

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 **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 **2100**.