1200 SERIES
SPECTROPHOTOMETER
SOFTWARE USER'S MANUAL

Version SS-1.22

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Introduction

The **UNICO® Application Software**--**VIS1200** has been designed to operate with **UNICO® Spectrophotometer Model 1200/1201**. The software runs on a PC (personal computer) with Windows® 95/98/Me/NT/2000/XP operating system installed.

Your **UNICO® Application Software** package includes:

- One CD containing the software (**VIS1200**)
- Software User's Manual
- A 6' 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.

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, display the results graphically, and calculate the reaction rate within a given time interval.

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 **VIS1200** 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 VIS1200** in your PC for your Model **1200/1201** Spectrophotometer.

Figure-1 Automatic Setup Screen

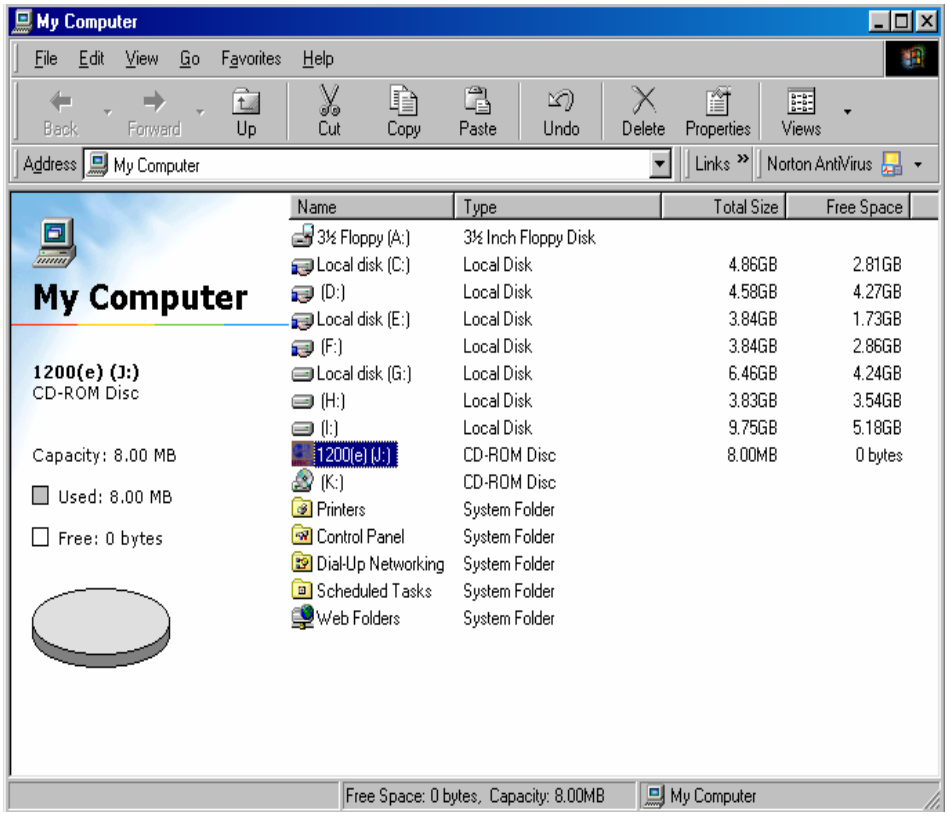


Figure-2 Locate CD Drive Screen

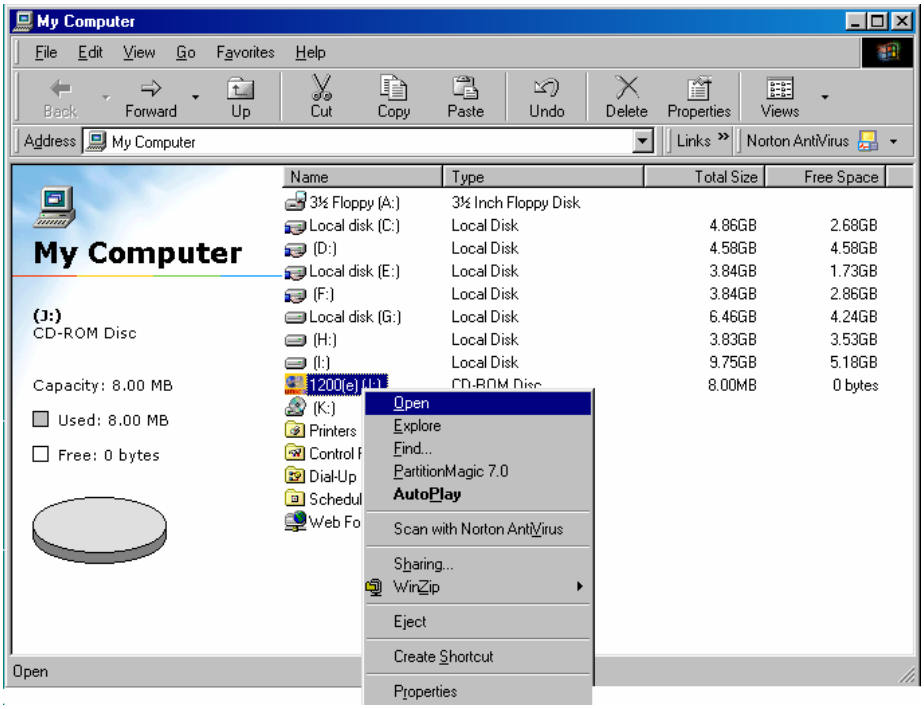


Figure-3 Open the CD

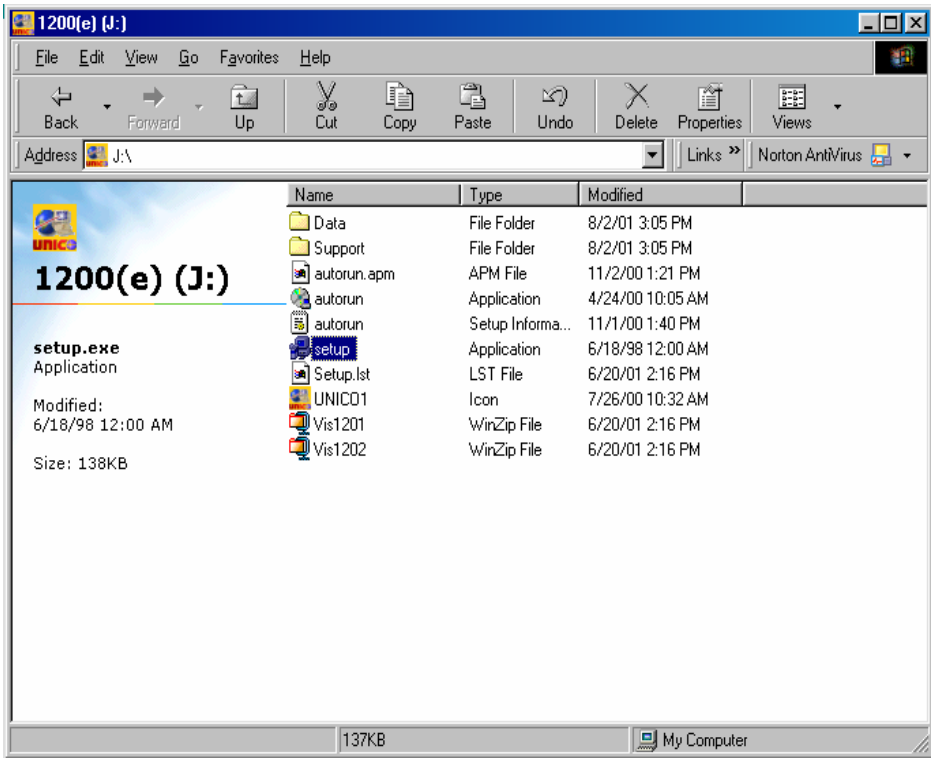


Figure-4 Click “setup.exe”

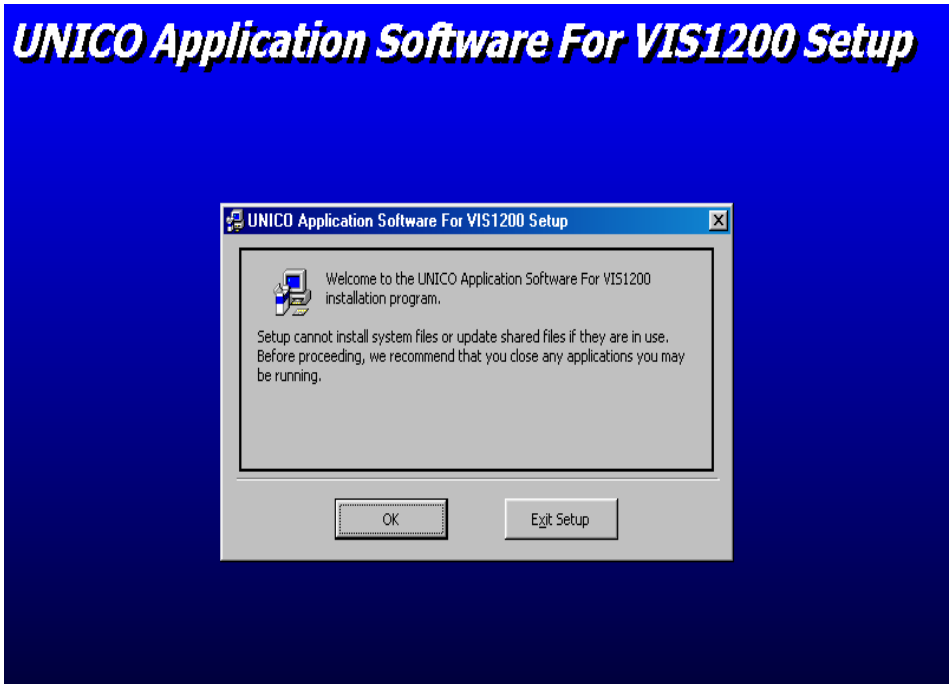


Figure-5 Setup Screen

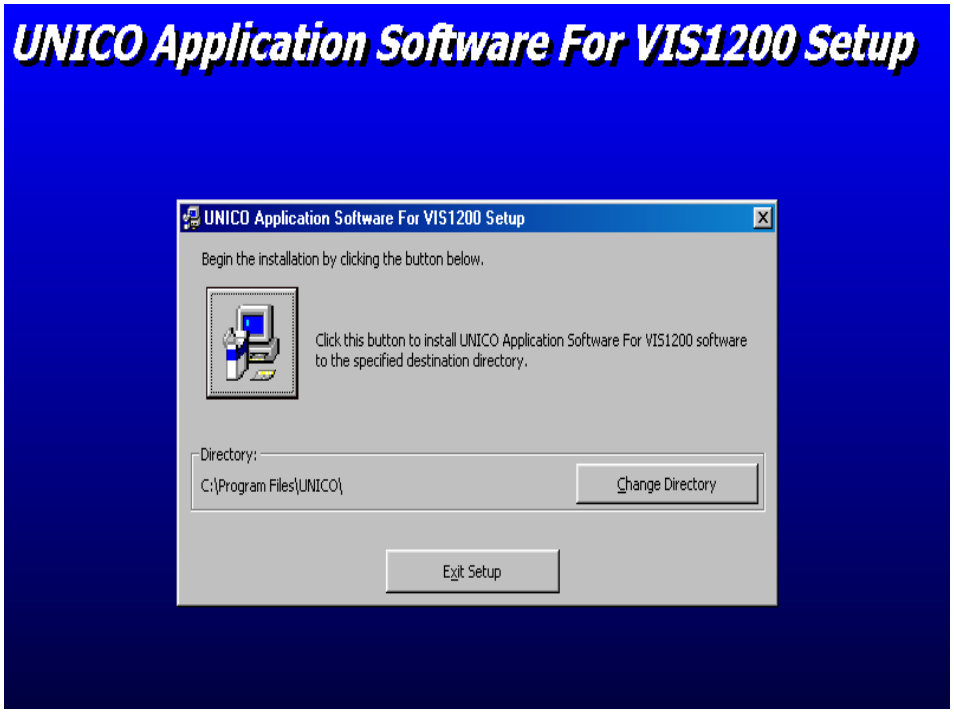


Figure-6 File Setup Directory Selection I

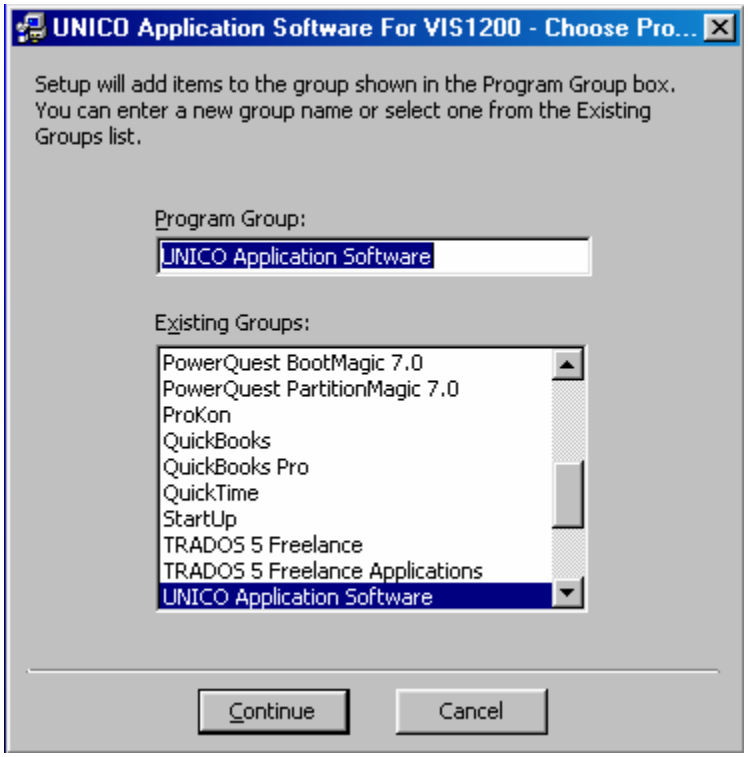


Figure-7 File Setup Directory Selection II

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).

Step 3: **1200/1201** Spectrophotometer has a male 9-pin RS-232C port on the back panel, located to the left side of the **1200/1201**. Connect the other end of the connection cable to your **1200/1201** and secure tightly.
Step 4: Turn on your PC (if not already on) and your **1200/1201** (if not already on and let it warm up for fifteen minutes).
Step 5: Click the **Start** button on your PC, scroll to **Programs**, **UNICO® Application Software** and locate the **VIS1200** (Figure-10), and click it.
Step 6: The Start-up Screen of **VIS1200** will appear as Figure-11 shown.
Step 7: Push the **ENT** key on the **1200/1201** panel, select the proper port, and then click **OK** on your Computer Screen. The **VIS1200** will initialize and go to the main screen (Figure-12).

CAUTION: Do NOT use any button on the 1200/1201 panel while the VIS1200 is running and connected with 1200/1201. Otherwise the data collected may not be correct!

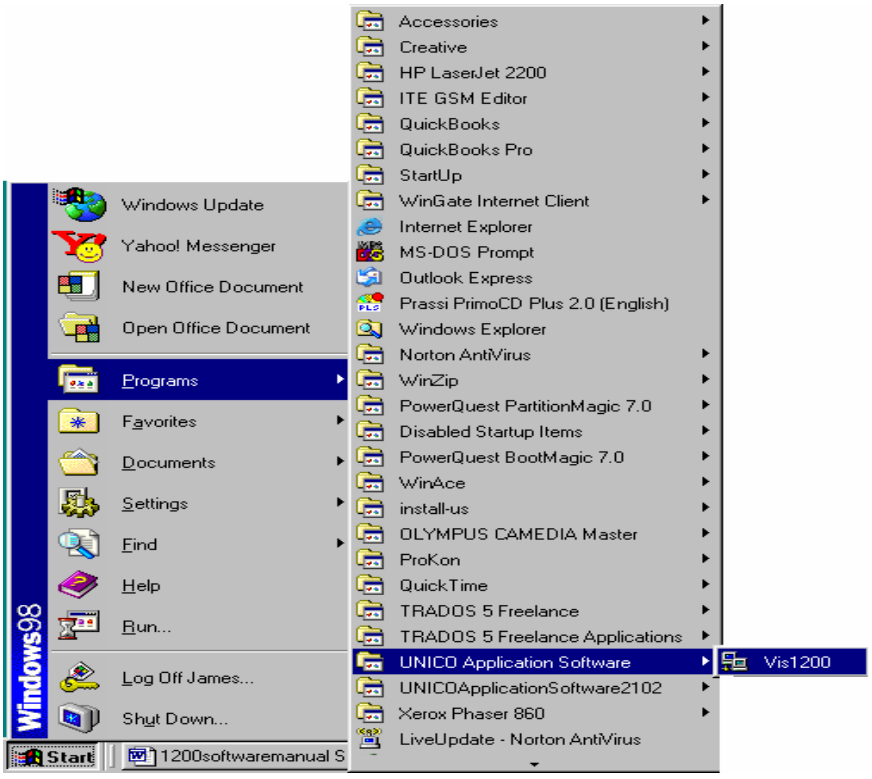


Figure-10 Open the Software

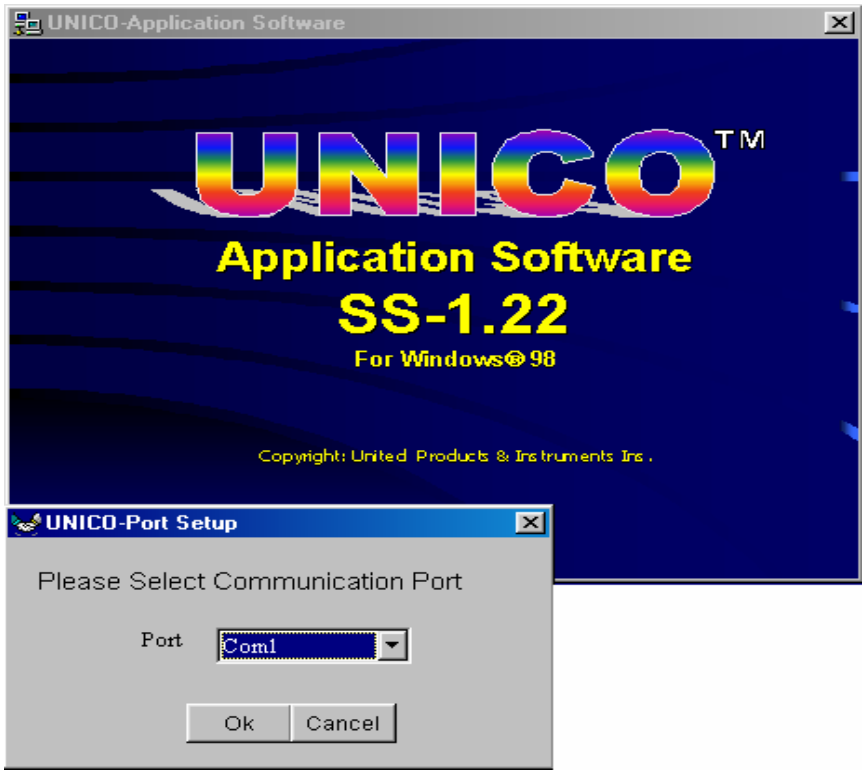


Figure-11 Start-up Screen

Main Screen Display

After your **1200/1201** is connected to your PC, and **VIS1200** is running, your PC will show the **Main Screen Display** like Figure-12. Type your **User Name** in the Text Field at the right of the **User Name (U):** label or leave it blank, then click the **OK** button to login as Figure-13 shown.

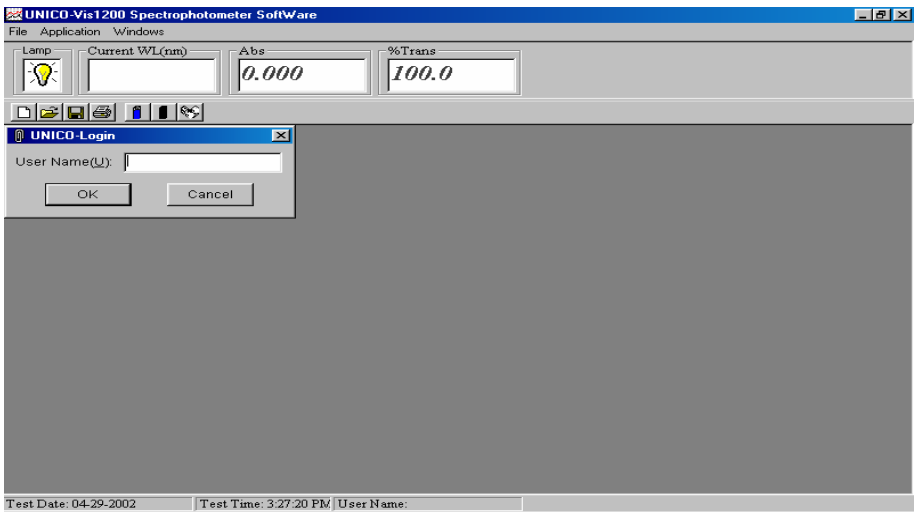


Figure-12 Main Screen Display

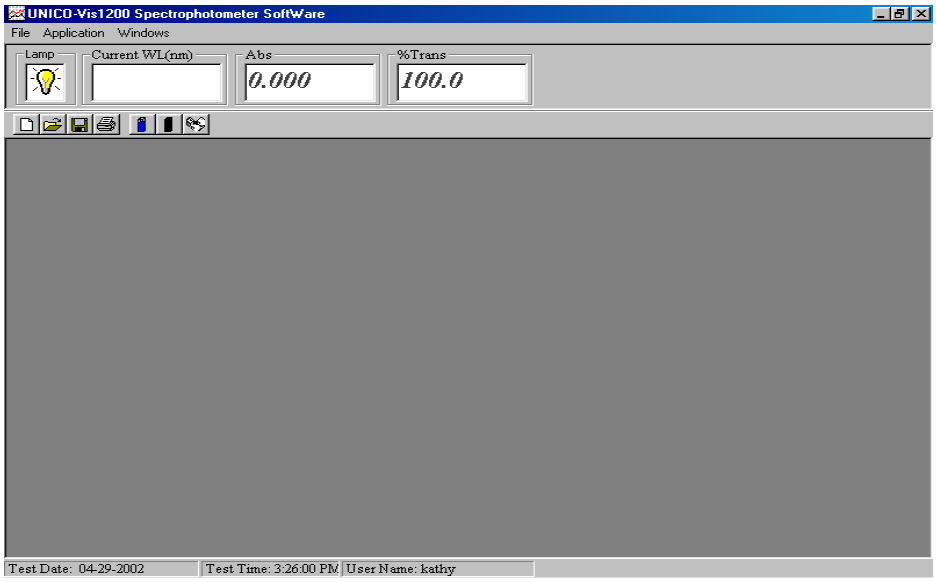


Figure-13 Main Screen Display After User Login

Functions of Drop-down Menu, Text Field, and Icon Button

Drop-down Menu

Two **Drop-down Menus**: **File** (Figure-14) and **Application** (Figure-15) are illustrated below.

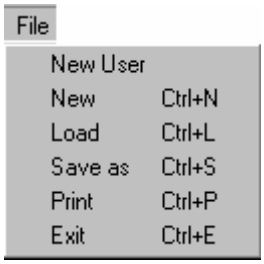


Figure-14 **File Drop-down Menu**

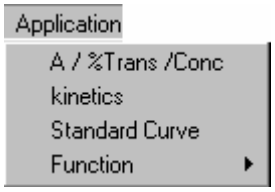


Figure-15 **Application Drop-down Menu**

File Drop-down Menu has six functions: **New User**, **New**, **Load**, **Save as**, **Print**, and **Exit**. All of them have hot keys except the first one.

- **New User**: change user name
- **New**: reset **Text Parameter** and begin new test
- **Load**: open any saved file (.tst)

- **Save as**: save the setup or data displayed
- **Print**: print all information shown in the Data Screen and any data collected.
- **Exit**: quit the **VIS1200**

Application Drop-down Menu can select three **Analytical Methods** of the **1200/1201** Spectrophotometer: **A/%Trans/Conc**, **Kinetics**, and **Standard Curve**.

- **A/%Trans/Conc**: measure **Absorbance**, **%Transmittance**, **Concentration/Standard**, or **Concentration/Factor**.
- **Kinetics**: measure a sample's **Absorbance** change over a selected period of time, store the test results in data table, display the results graphically, and calculate the reaction rate within a given time interval (**Function Menu** is part of the **Kinetics Analytical Method**).
- **Standard Curve**: create a calibration curve (choice of 4 curve fits) with up to 8 standard solutions to determine **Concentrations** of unknown samples.

Text Field

Three Text Fields are just below **File Drop-down Menu** and under the label: **Current WL(nm)**, **Abs**, and **%Trans** (Figure-16).

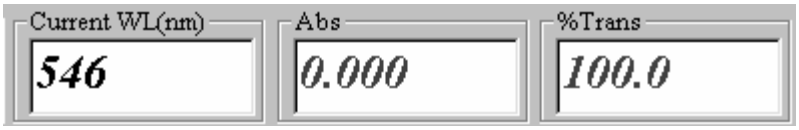


Figure-16 Text Field

Current WL(nm) Text Field: display the last selected wavelength of the spectrophotometer.
Abs Text Field: display the current data in Absorbance.
%Trans Text Field: display the current data in %Transmittance.

Icon Button

Seven **Icon Buttons** are below the Text Field (Figure-17).

Figure-17 **Icon Button**

The four Icon Buttons counting from the left end of the Figure-17 have the same functions as **New, Load, Save as, Print** of the **File Drop-down Menu**.

0A/100%T Icon Button: set **0 Absorbance** and **100%T**. Insert reference into **Sample Compartment** and click  button (blue colored) (move cursor on to the blue cuvette icon--the fifth icon from left end of Figure-17 and right touch the mouse, it will show **0A/100%T** sign) (Figure-18).

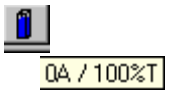


Figure-18 **0A/100%T Icon Button** for **BLANKING**

0%T Icon Button: set **0%T**. Remove cuvette from Sample Compartment before clicking  button (black colored) (move cursor on to the black cuvette icon--the sixth icon from left end of Figure-17 and right touch the mouse, it will show **0%T** sign) (Figure-19).

Figure-19 **0%T Icon Button**

Reset Button: unlock the screen. If the screen frozen due to improper operations, **BLANK** may show in the Text Fields below **Abs** and **%Trans** labels (Figure-16), click  button to reset them and unlock the screen.

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** (Figure-13), click **Application Drop-down Menu**, and click **A/%Trans/Conc** (Figure-15) to enter the **Main Screen of A/%Trans/Conc** (Figure-20).

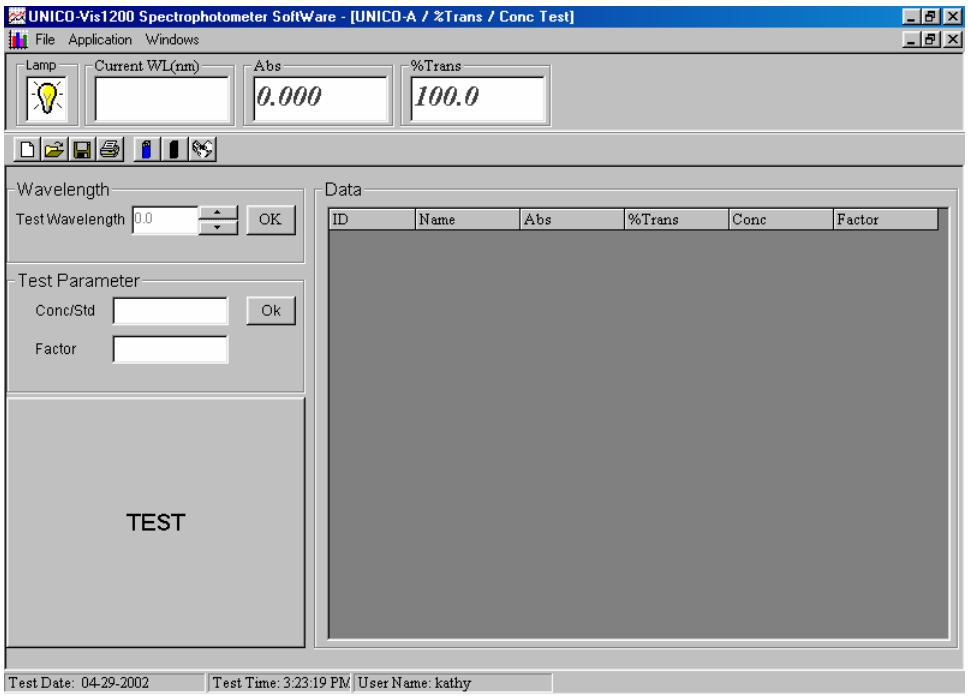


Figure-20 **Main Screen of A/%Trans/Conc**

The **A/%Trans/Conc Analytical Method** has five operation functions: **Test Wavelength** Text Field, **Test Parameter** Test Field, **TEST** Button**, Data Table**, and **Test Date**:

- **Test Wavelength** Text Field: select the desired wavelength by moving the dial on the spectrophotometer and clicking  button on the PC screen, click **OK** button (Figure-21) at the right of  button to set the wavelength (Figure-22). The wavelength will be shown both in the Text Field below **Current WL(nm)** label and Text Field at the right of the **Test Wavelength** label.

- **Test Parameter** Text Field: If standard solution is available, type the **concentration** values of the standard into the Text Field at the right of **Conc/Std** label, insert the standard into Sample Compartment and click the **OK** button. Spectrophotometer will take measurement of the standard and display factor value. The unknown sample concentrations can then be measured. If factor value is available, enter the factor value into the Text Field at the right of **Factor** label for the unknown sample concentrations calculation (Figure-21).

- **TEST** Button: record the readout of a given sample (Figure-23).

- **Data Table**: record **ID**, **Name**, **Abs**, **%Trans**, **Conc**, and **Factor** related with the test (Figure-23)

- **Test Date**: **Test Date** will be displayed automatically. To alter it, simply click it at the left corner of the screen and enter the desired date (Figure-24).
-

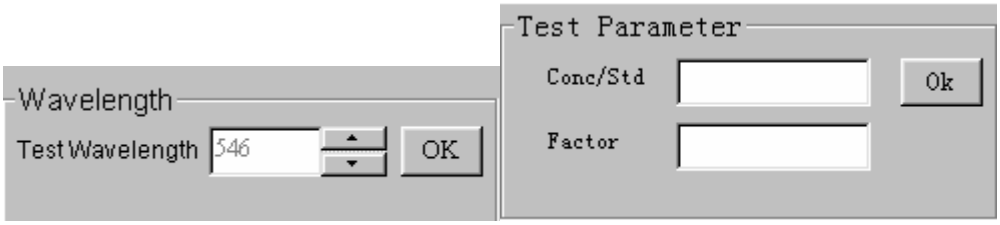


Figure-21 **Test Wavelength** and **Test Parameter**

Absorbance/%Transmittance Mode

The following are the basic operations (Figure-25).

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

Step 2: Select the desired **wavelength** by moving the **WAVELENGTH** dial on the **1200/1201**. Click  button on the PC screen to match the desired **wavelength**, click **OK** button at the right of  button to set the wavelength.

Step 3: Click on **0A/100%T Icon Button**--  button (the blue cuvette icon) to **blank** the reference.

DO NOT PUSH ANY BUTTONS ON THE 1200/1201. THIS WILL CAUSE FOR YOU TO RE-BOOT THE SOFTWARE.

Step 4: 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**.

Step5: You may type in sample name or change the sample name under the **Name** label inside the **Data Table**.

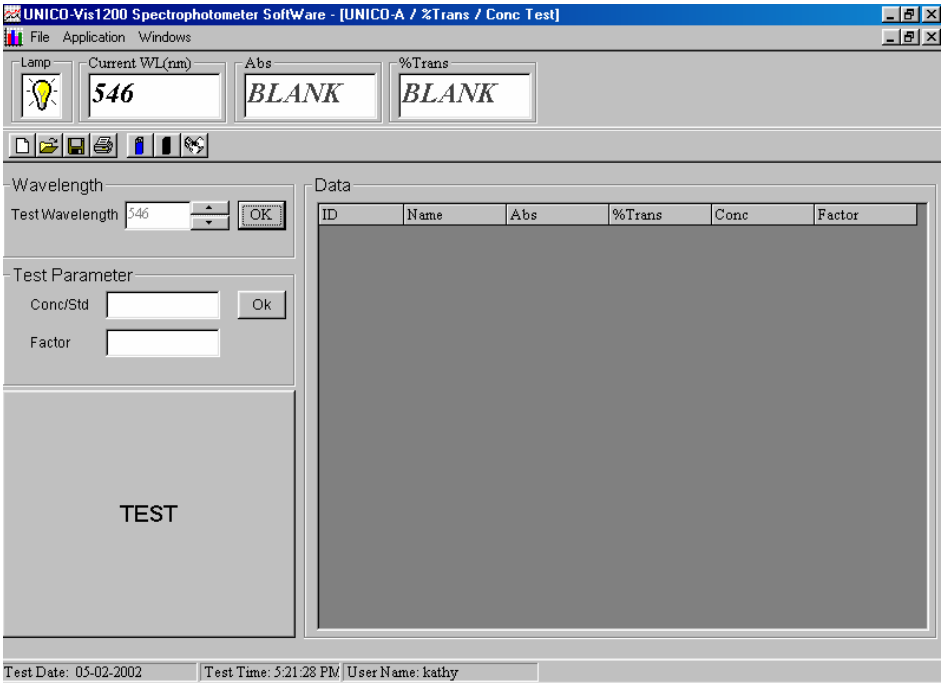


Figure-22 Wavelength and Reference Setting

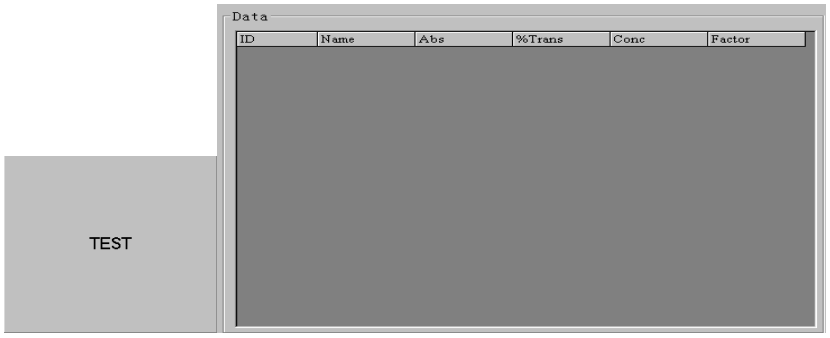


Figure-23 **TEST** Button and **Data Table**

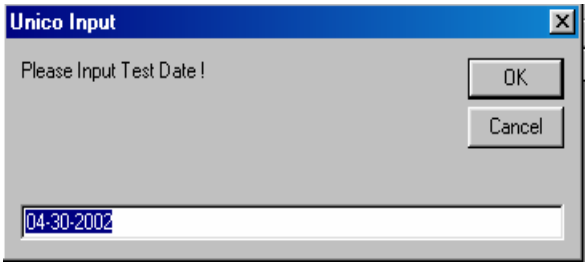


Figure-24 **Test Date**

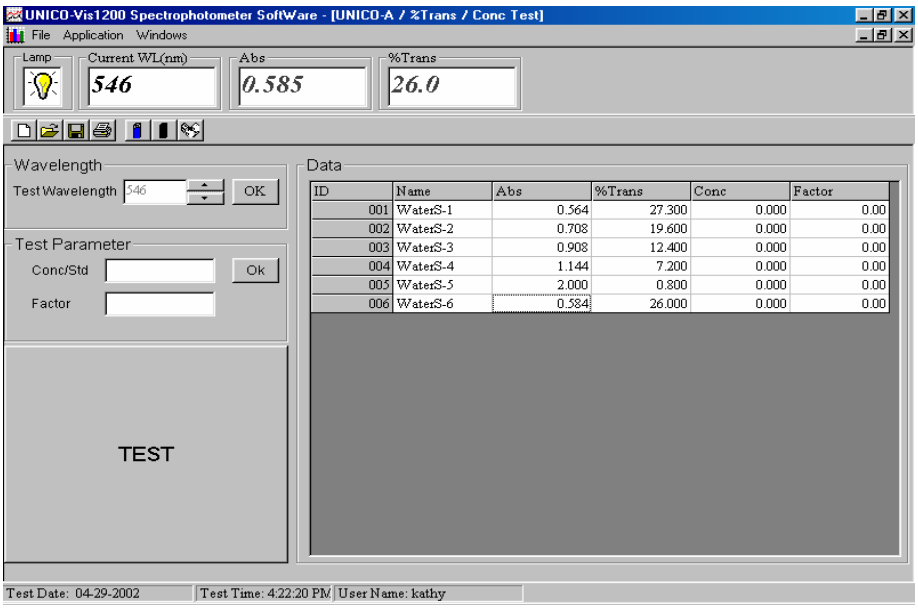


Figure-25 Sample Test Results of **Absorbance/%Transmittance Mode**

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: Type in the known concentration of the standard solution in the Text Field at the right of **Conc/Std** label.

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

Step 6A: Click the **OK** Button in **Test Parameter** section. This will measure the **Absorbance** of the standard and set its conversion **Factor** for measuring the unknown samples (Figure-26).

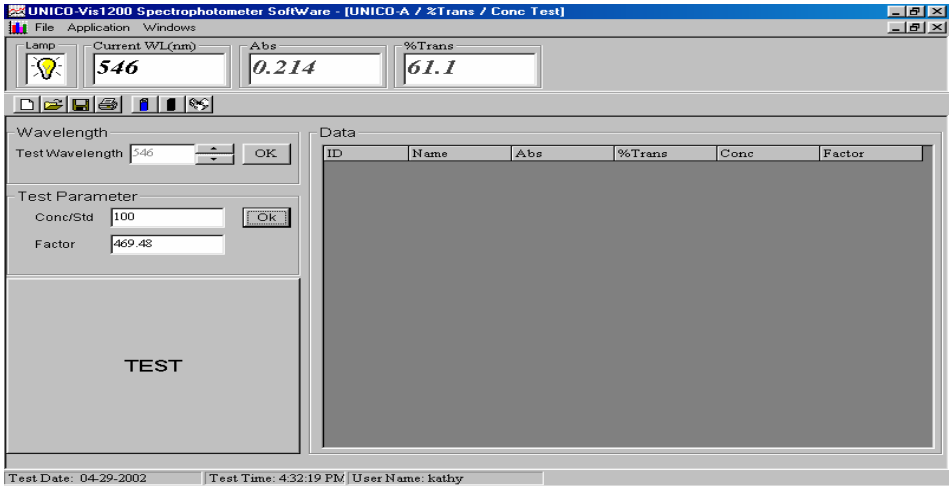


Figure-26 Standard Solution **Absorbance** Measurement

Step 7A: Place your sample(s) in the Sample Compartment and click the **TEST** Button for each sample to be measured. **Absorbance**, **Transmittance** and the **Concentration** of the samples will be displayed in the **Data Table** (Figure-27).

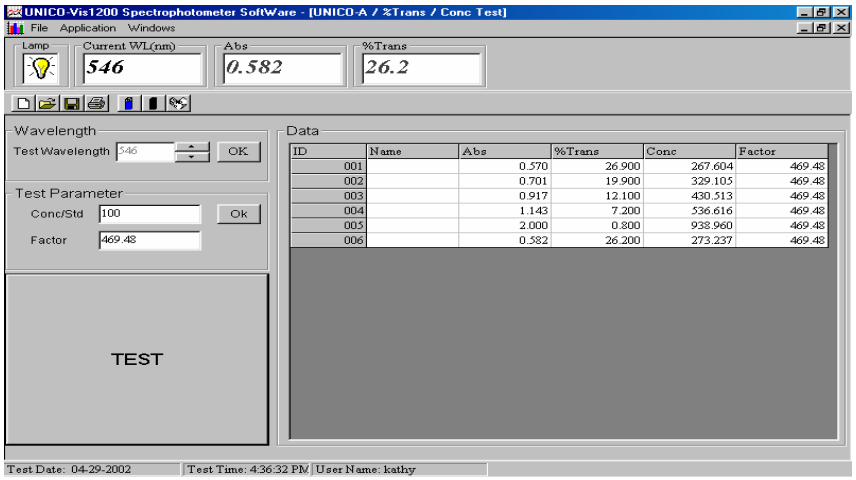


Figure-27 Sample Test Results of **Concentration/Standard Mode**

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: Type in the desired **Factor** in the Text Field at the right of the **Factor** label.

Step 5B: 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**, **Transmittance** and **Concentration** of the samples will be displayed in the **Data Table** (Figure-28).

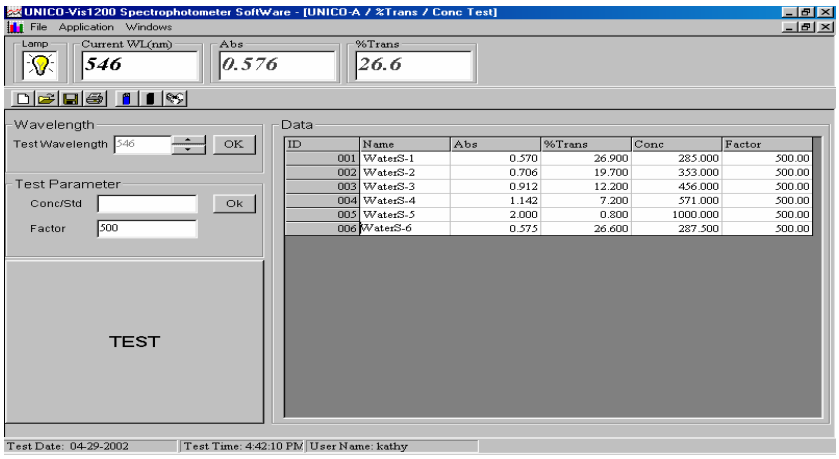


Figure-28 Sample Test Results of **Concentration/Factor Mode**

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:
  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** (Figure-13), click **Application Drop-down Menu**, and click **Standard Curve** (Figure-15) to enter the **Main Screen of Standard Curve** (Figure-29).

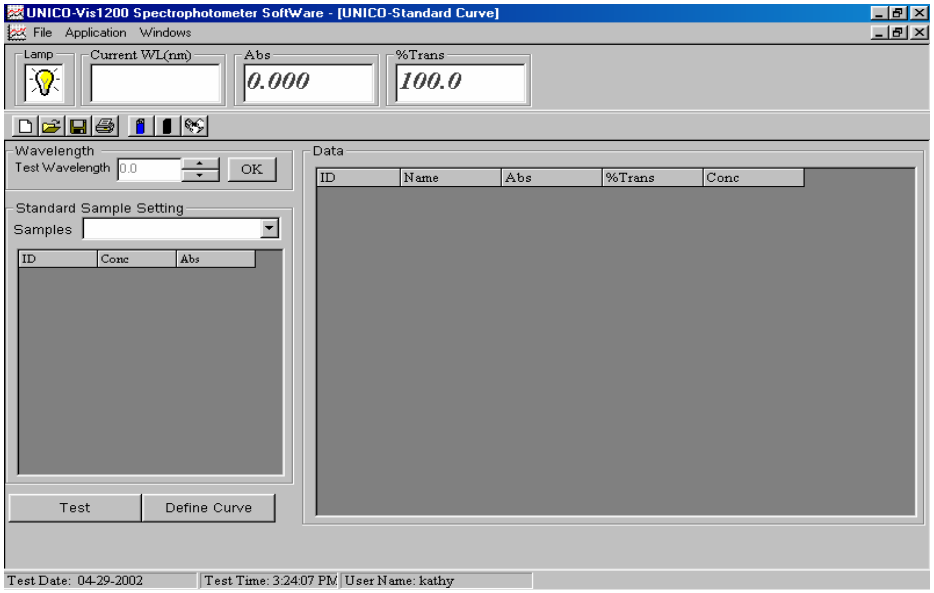


Figure-29 Standard Curve Setup

The following are the basic operations.

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

Step 2: Select the desired **wavelength** by moving the **WAVELENGTH** dial on the **1200/1200**. Click  button on the PC screen to match the desired

wavelength, click **OK** button at the right of  button to set the wavelength.

Step 3: Click on **0A/100%T Icon Button**--  button (the blue cuvette icon) to **blank** the reference.

Step 4: Under **Standard Sample Setting**, click the **Arrow** Button and set the number of standards (from 2 to 8) to be used (Figure-30).

Step 5: Place the standards in the Sample Compartment in order of lowest concentration to highest concentration. Type the concentration of the standards (e.g. 0.14 here) into the Text Field starting below **Conc** label and at the right of **ID 01** as Figure-31 shown. 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.

Step 6: Measure the **Absorbance** of each standard. For each measurement, insert the standard into Sample Compartment and click **Test** button. The **Absorbance** and **Transmittance** values will be recorded into the **Data Table**; then, double click in the appropriate **Absorbance** cell (**Abs**) (in the left table) next to the standard **Conc** to get the **Absorbance** for curve drawing. Continue until all of the standards have been measured (Figure-31). Alternatively, if you do not want the **Absorbance** of the standards to be recorded into the **Data Table**, you may select the appropriate **Absorbance** cell (**Abs**) (in the left table) next to the standard **Conc** and double click the mouse to get the **Absorbance** results.

Step 7: Press the **Define Curve** Button (Figure-31) to graph the **Standard Curve** (e.g. WaterS-1 to WaterS-6 are the standards) (Figure-32) and you may **save** it for future use.

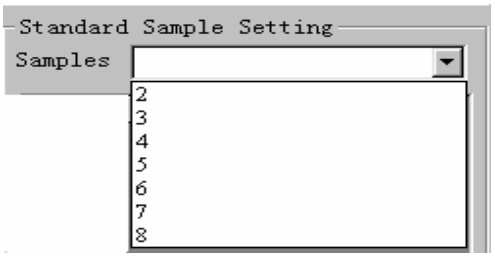


Figure-30 **Standard Sample Setting**

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 four buttons (Figure-33). Shown in Figure-32 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** 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  (arrow return button) to return to the main **Standard Curve** screen (Figure-31).

Step 4: To measure the concentration of unknowns, place the samples in the Sample Compartment and click on **Test** button (Figure-31), 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.**

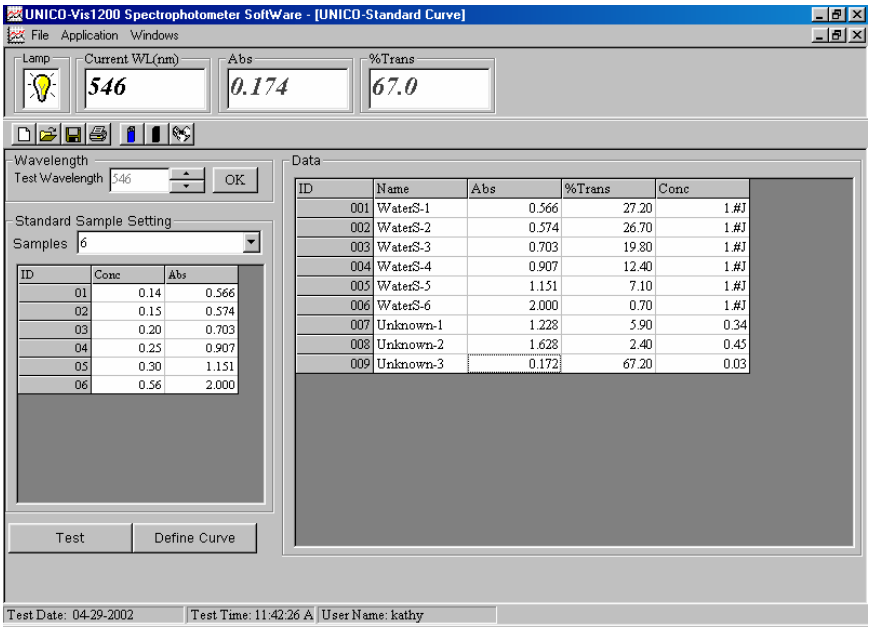


Figure-31 Sample Test Results of **Standard Curve**

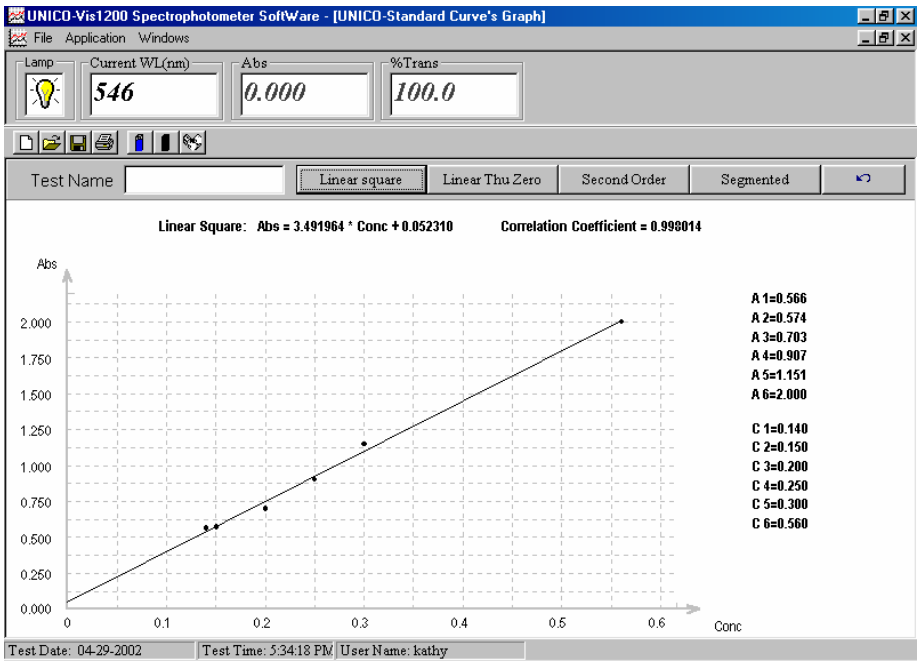


Figure-32 **Standard Curve** Graph Display

Figure-33 Buttons for **Standard Curve** Test

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
- Get the reaction rate within a given time interval

Main Screen of Kinetics

At the **Main Screen** (Figure-13), click **Application Drop-down Menu**; click **Kinetics** (Figure-15) to enter the **Main Screen of Kinetics Test** (Figure 34).

The following are the basic operations.

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

Step 2: Select the desired **wavelength** by moving the **WAVELENGTH** dial on the **1200/1201**. Click  button on the PC screen to match the desired **wavelength**, click **OK** button at the right of  button to set the wavelength.

Step 3: Click on **0A/100%T Icon Button**--  button (the blue cuvette icon) to **blank** the reference.

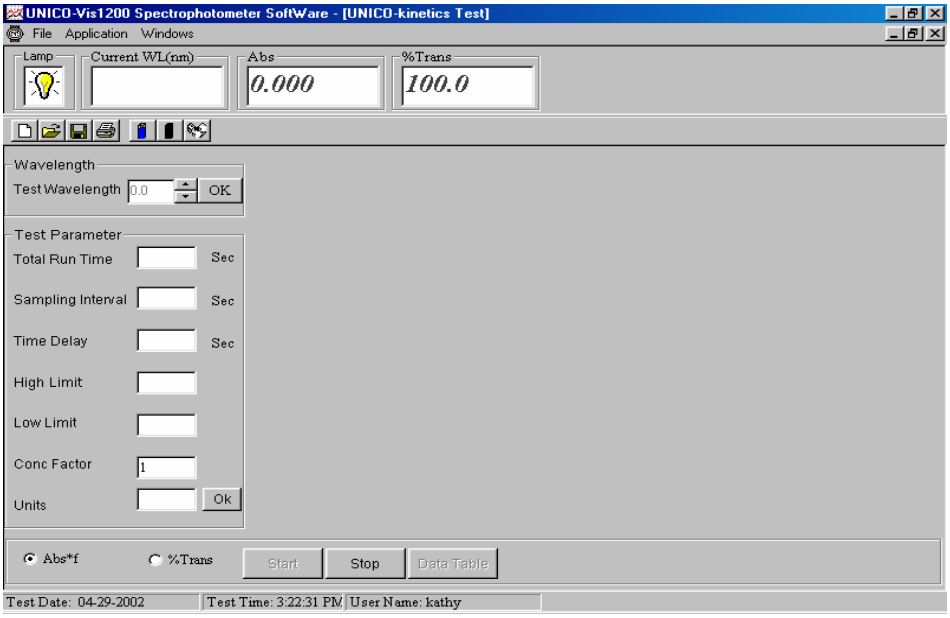


Figure-34 **Kinetics Test** Main Screen

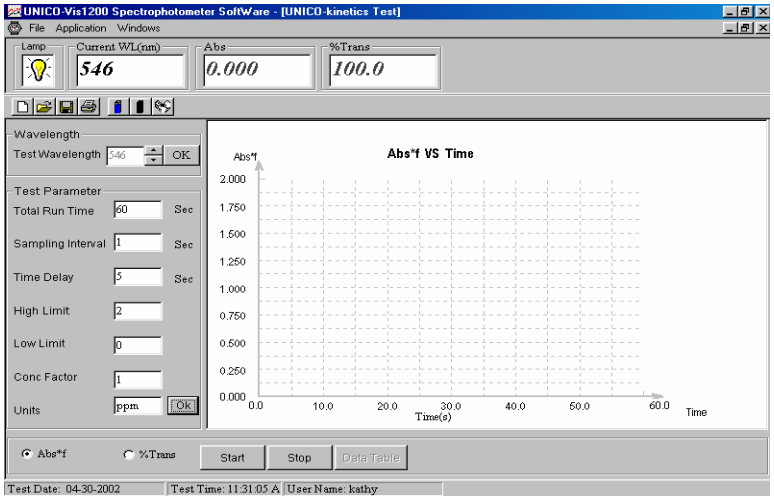


Figure-35 **Test Parameters** Setting

Step 4: Set the **Test Parameters** (Figure-35) (**Step 4 to Step 8**). Set the **Total Run Time** by typing into the Text Field on the right of the **Total Run Time** label. This is the total time for the reaction to occur.

Step 5: Set **Sampling 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 **Time 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 **Conc 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: Place your sample in the Sample Compartment and click the **Start** Button once all the **Test Parameters** have been set and you are ready to start your measurement (Figure-36).

Notes: **Data Table**: once measurements have been made, clicking this button will allow you to view the data collected (Figure-37). Only **Cell 2** of the **Data Table** is currently used to store the data collected, others are for future applications.

Stop Button: stops the data collection at any given moment.

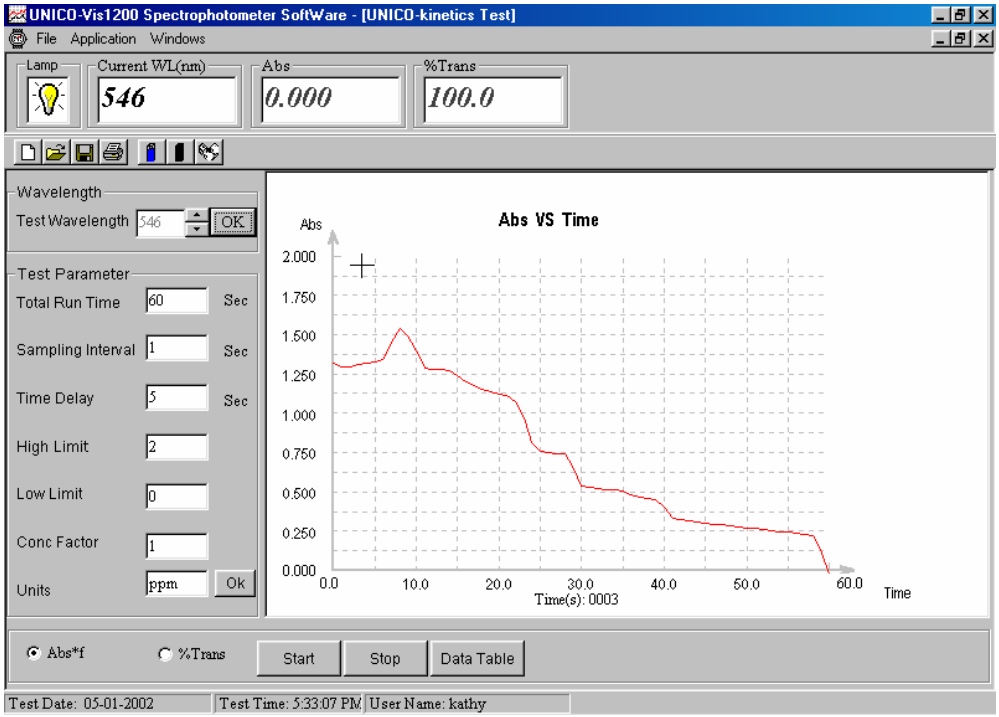
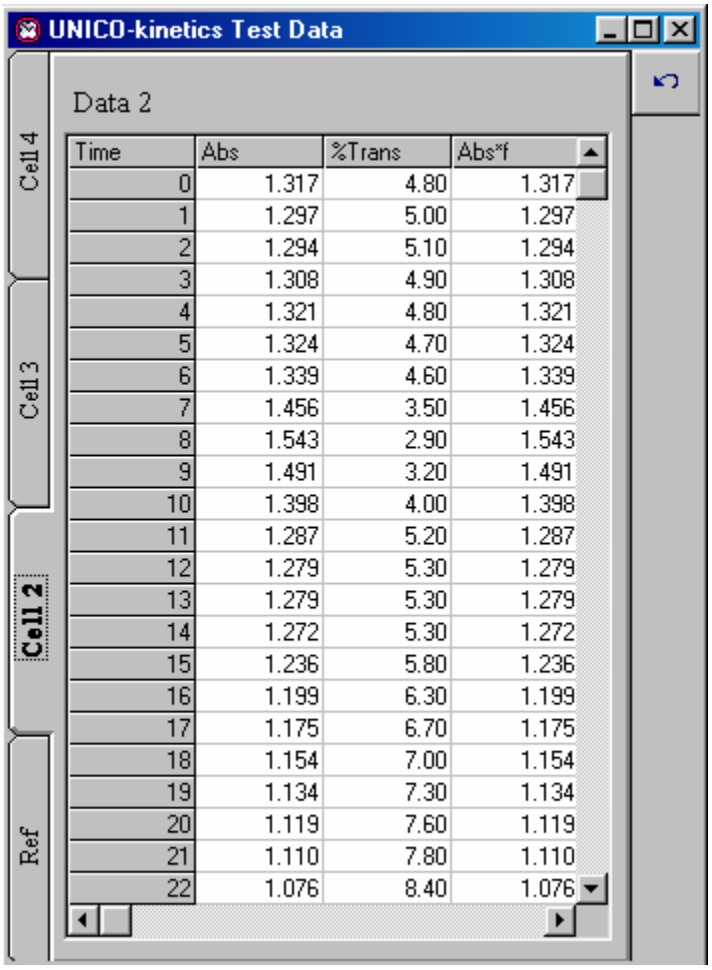


Figure-36 Sample Test Results of **Kinetics**



Time	Abs	%Trans	Abs*f
0	1.317	4.80	1.317
1	1.297	5.00	1.297
2	1.294	5.10	1.294
3	1.308	4.90	1.308
4	1.321	4.80	1.321
5	1.324	4.70	1.324
6	1.339	4.60	1.339
7	1.456	3.50	1.456
8	1.543	2.90	1.543
9	1.491	3.20	1.491
10	1.398	4.00	1.398
11	1.287	5.20	1.287
12	1.279	5.30	1.279
13	1.279	5.30	1.279
14	1.272	5.30	1.272
15	1.236	5.80	1.236
16	1.199	6.30	1.199
17	1.175	6.70	1.175
18	1.154	7.00	1.154
19	1.134	7.30	1.134
20	1.119	7.60	1.119
21	1.110	7.80	1.110
22	1.076	8.40	1.076

Figure-37 **Kinetics Data Table**

Math Function for Kinetics

VIS1200 provides additional features for you to calculate the **reaction rate** within a given time interval.

After your Kinetic test, keep the test curve screen open.

- Click **Application Drop-down Menu** and click **Function** as Figure-38 shown.
- Click **K**, type the **start**, **end** time, and **factor** into the appropriate Text Fields in the pop up window as Figure-39 indicated. Press **confirm** button to get the **reaction rate** graph (Figure-40).

If you want to get another reaction rate for a different time interval, simply go to **Function**, click **Replace**, it will return to the original test curve screen; repeat the above mentioned procedure, you will get the new **reaction rate** graph.

Figure-38 Math Functions for Kinetics

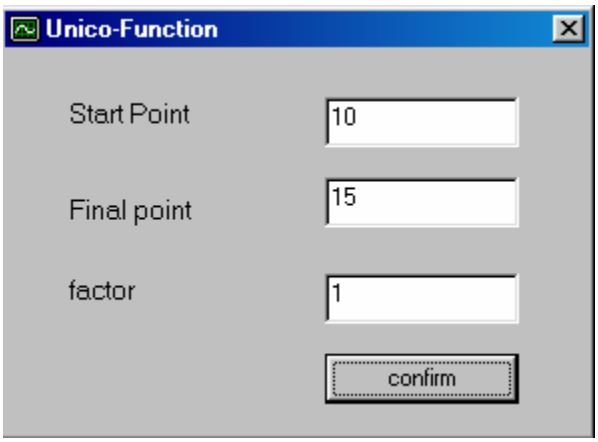


Figure-39 **Math Function** Setting

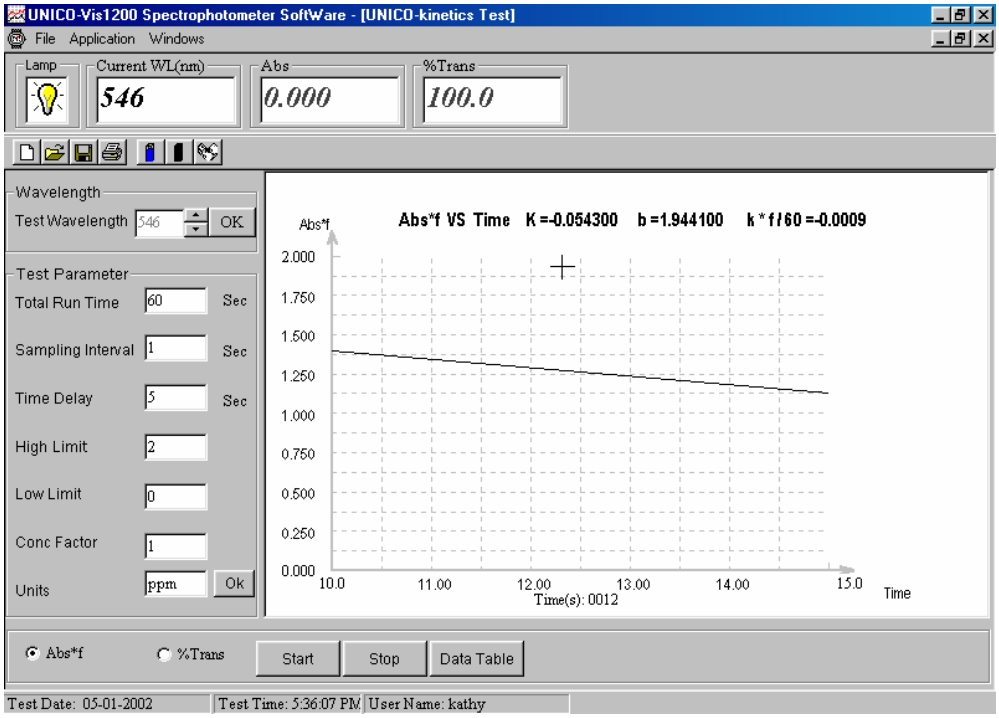


Figure-40 Sample Test Results of **Math Function of Kinetics**

Data import to Microsoft Excel®

By referring to the following steps, you can transfer any of the **UNICO® Application Software**—**VIS1200** 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 **VIS1200**. 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 **VIS1200**.

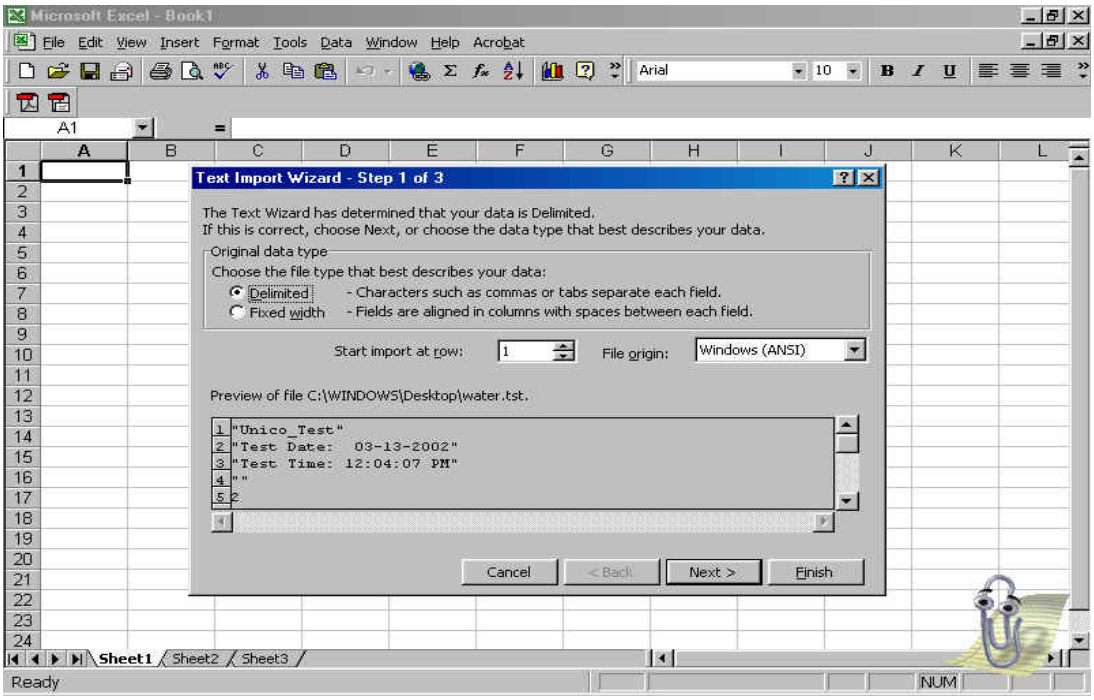


Figure-41 Excel Text Import Wizard I

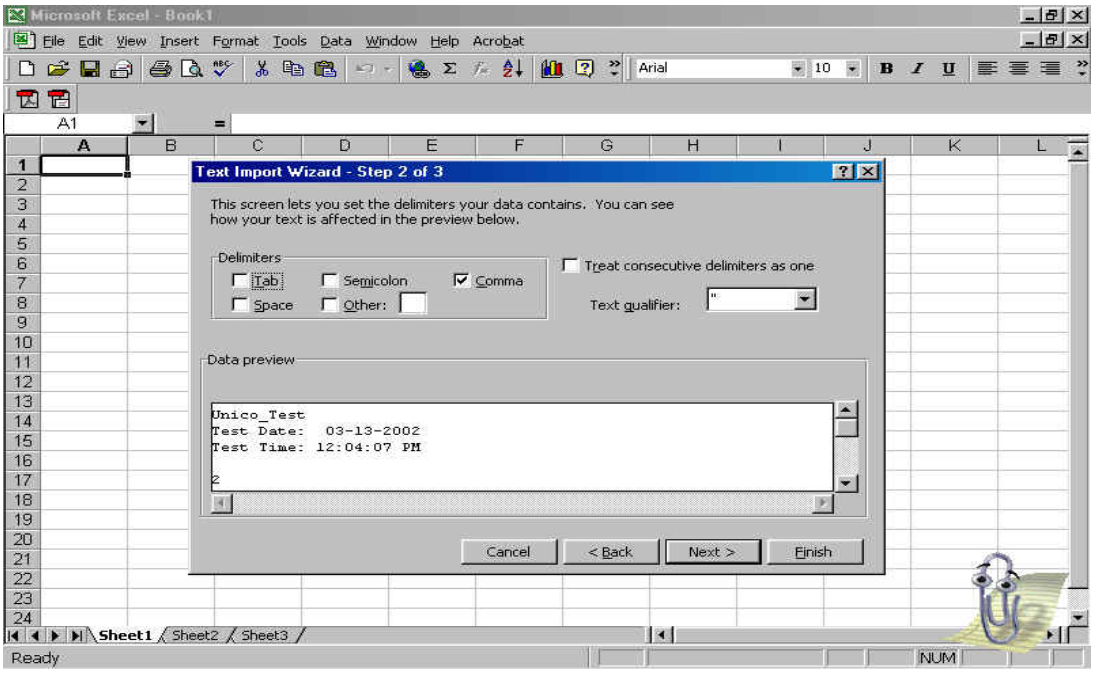


Figure-42 Excel Text Import Wizard II