BioLAB

Software Manual

Single Beam UV Visible Spectrophotometer

Thank you very much for Choosing Biolab products. Please read the "Operating Instructions" and "Warranty"
before operating this unit to assure proper operation.

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01 Introduction

UV Professional has the main function of Photometry, Quantitative analysis, Kinetics, Wavelength Scanning, Multi-wavelength analysis, DNA/Protein analysis. Software attached several additional features, for example: spectrum computing(spectrum addition, spectrum subtraction, spectrum multiplication and spectrum division). spectrum derivative and spectrum compare and so on.

1.1 Main functions

Photometry

·Two Test Mode: Absorbancy Data(Abs)/Transition Data(%T) in the custom wavelenth.

Quantitative Analysis

·Create standard curve with calibration standard samples ,or with user setup coefficient method.

·Up to 20 standard samples to the standard calibration curve or directly enter the standard curve coefficient.

·3 methods to standard curve fitting: zero-crossing first-order linear fitting, First-order linear fitting, second-order linear fit).

Time Scan

·Custom scan time interval:0.5 seconds, 1.0 seconds, 2.0 seconds, 5.0 seconds, 10.0 seconds,

30.0 seconds, and 1 Minute.

·2 display mode: Absorbancy Data (Abs), Transition Data (%T).

Wavelength scan

·Wavelength interval: 0.1nm, 0.2nm, 0.5nm, 1.0nm, 2.0nm and 5.0nm.

·3 test mode: Absorbancy Data (Abs), Transition Data (%T) and Energy.

·3 display mode: Absorbancy Data (Abs), Transition Data (%T) and Energy.

·System baseline can be stored.

Multi-wavelength Analysis

·up to 15 wavelengths can be set to do multi-wavelength analysis.

DNA / Protein Analysis

·built-in 2 analytical methods

·Test coefficient can be customized

1.2 Spectra treatment

Spectral data show

·Move the cursor to the spectrum position, the corresponding data will be displayed

Peak valley automatically search

·Automatically search the data peak and valley, and the data will be showed in the peak data list, the corresponding data remark shown in the picture.

Zoom in/out spectrum view

·Change the X Position/Y Position scale data to zoom in or zoom out the spectrum view.

Derivative spectra

·Calculate and display first-order to fourth-order derivative spectrum view. In the absorbance mode, the derivative spectrum view is an extremely effective method.

Spectrum computing

·Spectrum addition, spectrum subtraction, spectrum multiplication, spectrum division and spectrum derivative.

Dark Current Detect

·Retest the dark current data of instrument.

02 Installation

This chapter will show you how to install UV Professional in your personal computer.

2.1 System configuration

·Pentium or faster processor

·CD-ROM drive

·2 USB interface

·32MB RAM (recommend 256MB or more)

·50MB or more hard disk space

·Microsoft Windows 2000 or Windows XP operating system

2.2 Installation UV Professional

1. Put UV Professional CD into your CD-ROM drive.

2. In the CD-ROM root directory, double-click Setup.exe to start the installation progress, click

<Next> in the setup dialog, then select <accept this agreement...>, continue installation progress.
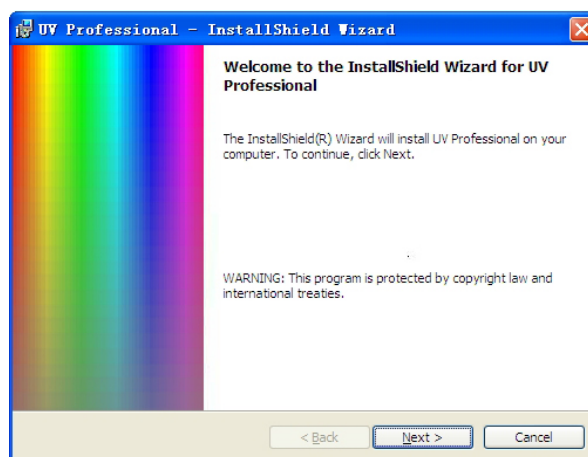
3. Clicking <change...> button custom the installation directory, click <Setup>, then to start to copy files to your computer.
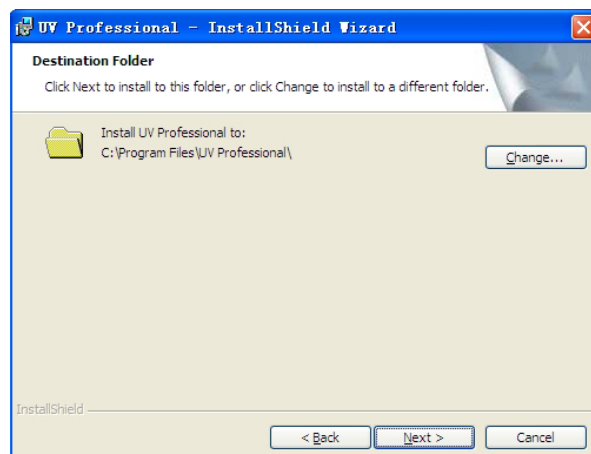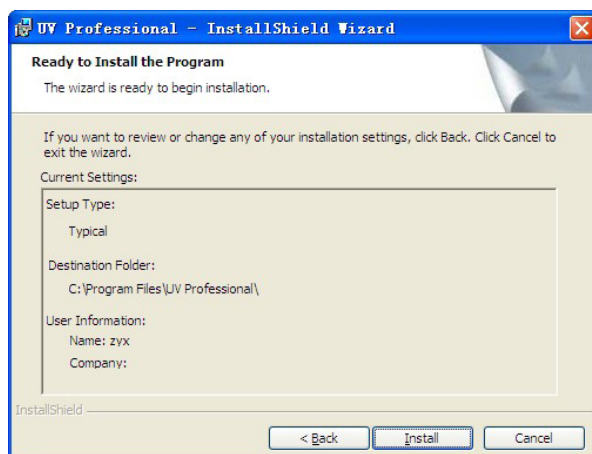
4. Click <Finished> to complete UV Professional installation process, setup progress automatically install UV key driver and communications USB port driver.

5. The installation process finished.

2.3 Uninstall UV Professional

There are 3 ways to safely uninstall UV Professional

1. In <Control Panel> and <Add or Remove Programs> dialog, select <UV Professional>, click the <uninstall> button.

2. In the start menu, <program> select <UV Professional> and <uninstall the UV professional>, the uninstall progress will automatically uninstall the UV professional software.
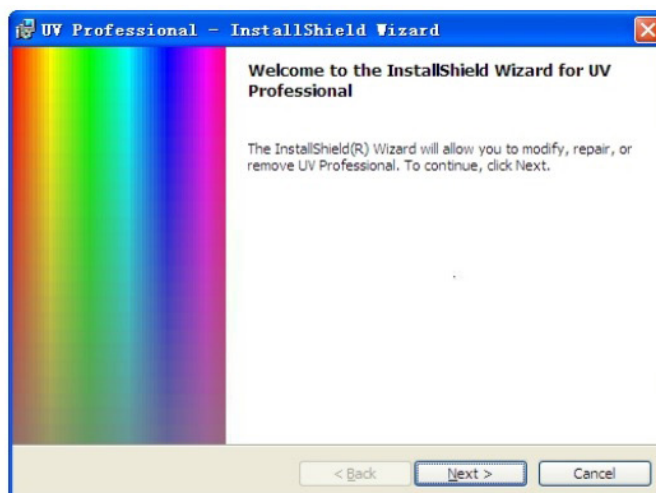
2.4 running UV Professional

After UV Professional progress is finished, insert UV Key to your PC, connect the instrument and PC with link cable..

There are two ways to run the UV Professional software

1. Double-click on the desktop [UV Professional] icon.

2. In the [Start] menu-> [All Programs] -> [UV Professional] -> [UV Professional], click [UV Professional] to start run UV Professional.
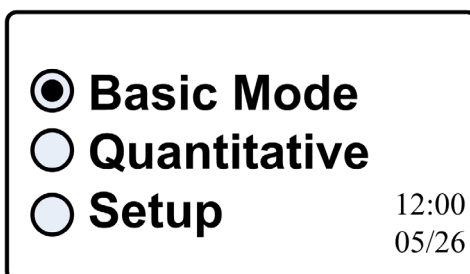
2.5 How to connect the instrument and PC.

1. Connect the instrument and PC with link cable.

2. Click connect button, software will automatically search the ommunication port to the instrument.

2.6 User information

Select the main menu <View>-><Option>-><Information>, enter the operator and the department information, click OK to save the change, this information will be used when print the test report.

2.7 Connect / release host

1. Turn on the power of the instrument, then it runs diagnostic program and warm up procedure. Then it goes into main menu.
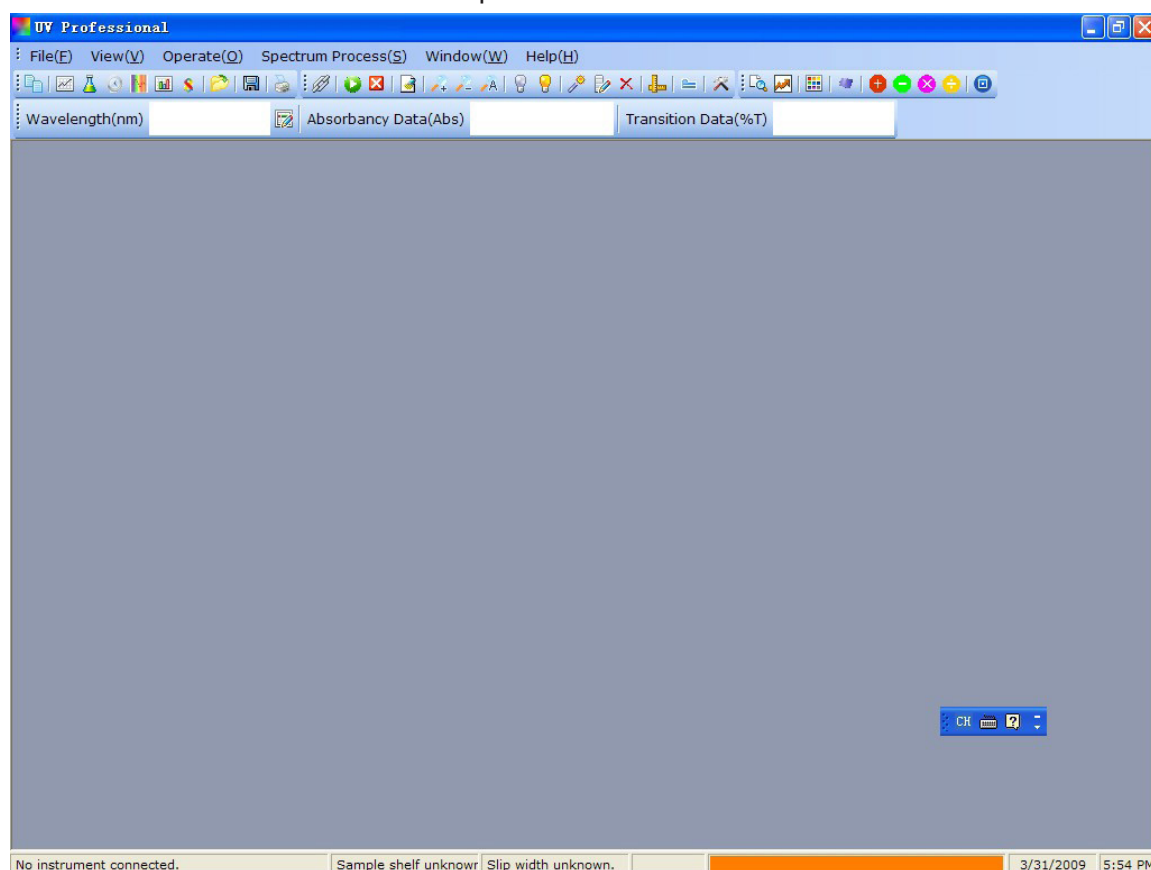

2. Click the shortcut on the toolbar button in the [Connect/Release] or select the main menu

<operation>->[Connect/Release], software will automatically connect to the instrument. Click the icon [Connect/Release] to release the instrument.

03 How to use the Software

This chapter shows you how to use UV Professional

3.1 Main interface

The main interface in the software startup:

3.2 Menu bar and toolbar

This software provides the Menu bar and Tools bar to make users easy access of different functions. At the same time, pop-up menu of right button include most commonly used functions to speed up user's operation.

Toolbar button list:

Main	list			introduction
File(F)	New file		[new file]	selection the new file type list, user can choose to photometry, quantitative, time scan, wavelength scan, multi-wavelength, DNA / protein.
			[Photometry]	Create new photometry file.
			[Quantitative]	Create new quantitative file.
			[Time Scan]	Create new time scan file.
			[Wavelength scan]	Create new wavelength scan file.
			[Multi-wavelength]	Create new multi-wavelength file.
			[DNA/protein]	Create New DNA/Protein file.
	Open		[open...]	Open the test data files.
	Save		[Save...]	Save the test data files.
	Print		[Print...]	Print test report.

Operate	**Connect/release**	**[Connect /release]**	**Connect or release the instrument.**
	Test	**[start test]**	**start test.**
	Stop	**[stop testing]**	**stop test.**
	Tungsten lamp	**[turn on/off tungsten lamp]**	**Turn on/off tungsten lamp.**
	Deuterium lamps	**[turn on/off deuterium lamp]**	**Turn on/off deuterium lamps.**

	Lamp switch wavelength		[lamp switching wavelength]	Set lamp switch wavelength.
	Modify		[Modified]	Modify test record.
	Delete		[Remove]	Remove test record
	System baseline		[Create system baseline]	Create the system baseline
	Set blank		[Set blank]	Set blank(0.000Abs/100.0% T)
	Set wavelength		[set wavelength]	Set wavelength
	Option		[Option...]	setup the option

Spectrum Operation	**peak search**	[peak search]	Search the data peak and valley.
	Set Peak value	[set Peak value]	set peaks and valley value
	Computing spectrum	[spectrum smoothing]	spectrum smoothing
		[Spectrum add]	the two spectra of addition operations
		[Spectrum subtraction]	two spectral subtraction operator
		[Spectrum multiplied]	two spectral multiplication
		[Spectral division]	the two spectra computing division
		[Spectrum Derivative]	spectra derivative operator
Windows	**cascading window**	[Cascade]	Cascade window
		[Tile Horizontally]	Tile horizontally window
		[Tile Vertically]	Tile vertically window

	help		[help...]	Help books.
Help	About		[About...]	Software version information and product ID information.

04 Operation

This chapter shows user the software's main functions: photometry, quantitative, time scan, wavelength scan, multi-wavelength and DNA/protein.

4.1 Photometry

This function has two Test Modes: Absorbancy Data(Abs) and Transition Data(%T) in a fixed wavelength.

4.1.1 Measurement

1. Click the shortcut toolbar [Photometry], or <New files> ->< Photometry > to create a new

4.1.2 How to test

1. Put the sample into the light path, select the menu <operation> <Set Blank> or click the shortcut toolbar buttons [Set Blank], instrument will be set to the operating wavelength, and set blank 0.000 Abs/100.0 %T.

2. Put the samples into light path, select the main menu <operation> <start test> or click the

shortcut toolbar buttons [start test] to measurement the current Absorbancy Data(Abs) and Transition Data(%T), then display the data in the data list.

4.2 Quantitative

Quantitative have two methods: standard curve method and coefficient method to measure the concentration.

4.2.1 Measurement

1. Click the shortcut toolbar [Quantitative], or <New files> -><Quantitative > to create a new quantitative file.
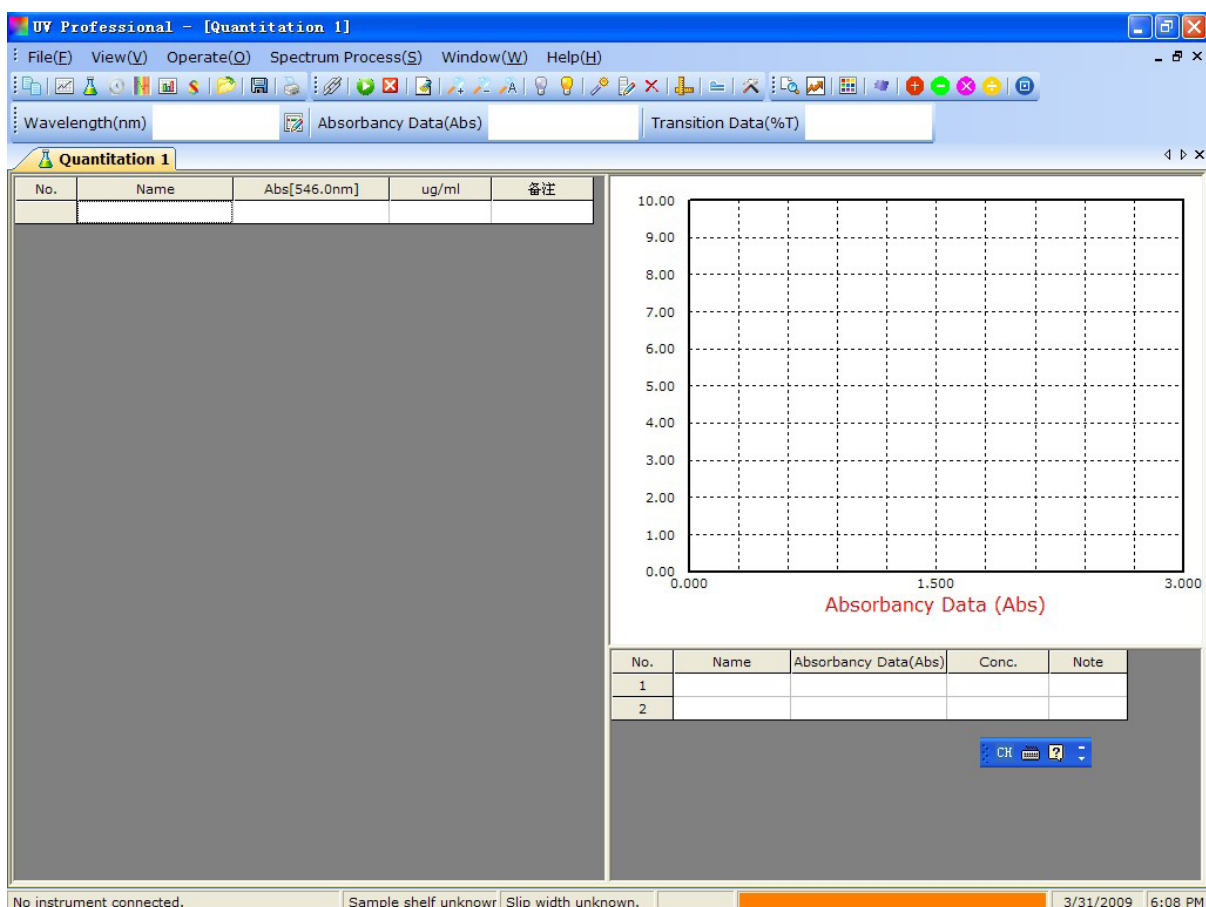

2. Shortcut toolbar [Option] to setup quantitative methods, concentration units, the number of wavelengths, coefficient. Click <OK> to save configuration.

4.2.2 Coefficient

1. Select Coefficients methods, third-order fitting, single wavelength 500nm. The following diagram is configuration:

2. Put the sample into the light path, select the menu <operation> <Set Blank> or click the shortcut toolbar buttons [📖 Set Blank], instrument will be set to the operating wavelength, and set blank 0.000 Abs/100.0 %T. Coefficient formula is shown as follows.
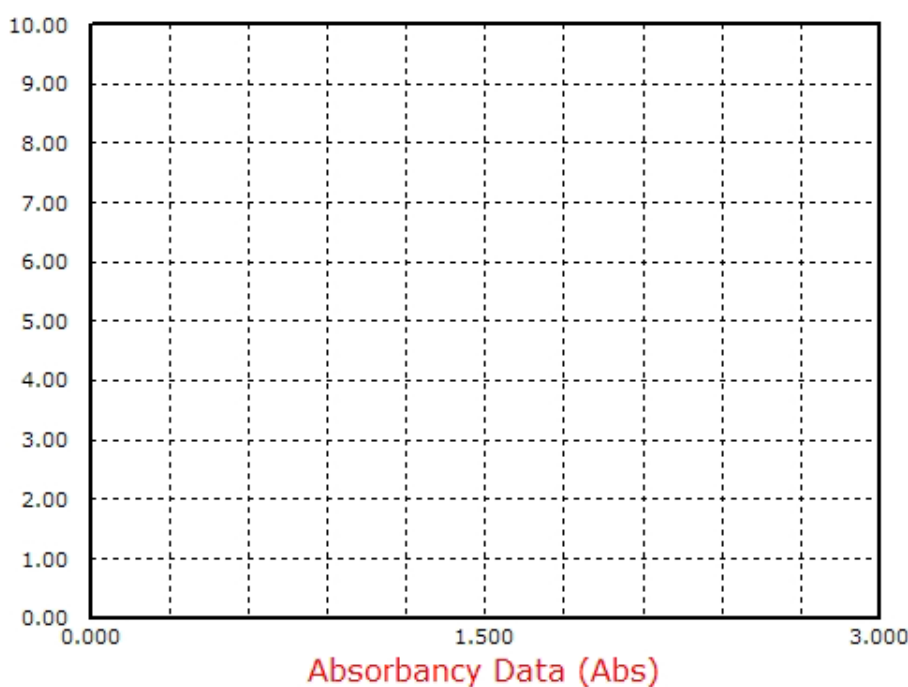
3. Put the samples into light path, select the main menu <operation> <start test> or click the shortcut toolbar buttons [⬛ start test] to measurement the current absorbance data, calculate the concentration within the above formula, then display the data in the data list.

4.2.3 To Calibrate standard samples

1. Select standard samples calibration option, change the sample number(maximum number is 20), click <OK> button to complete the setup.

2. In the standard sample data list table, enter the concentration of each sample.

3. Put blank sample into light path, select the menu <operation>-> <Set Blank> or click the shortcut toolbar buttons [⬛ Set Blank(0.000 Abs/100.0%T)], Instrument will be set to the wanted wavelength, the data will be set to 0.000 Abs/100.0%T.

4. Put the standard sample into light path, double-click the corresponding sample's Absorbency data table. Software will read the Absorbance values of standard sample and displays in the list table.

5. Measure other standard samples in the same way.

6. After all standard sample's Absorbency are measured, the software will calculate the curve parameter and displays the curve line and formula on the screen.

7. Put blank sample into light path, select the menu <operation>-> <Set Blank> or click the shortcut toolbar buttons [⬛ Set Blank(0.000 Abs/100.0%T)], Instrument will be set to the wavelength, the data will be set to 0.000 Abs/100.0%T.

8. Put the samples into light path, select the menu <operation> <start testing> or click the shortcut toolbar buttons [⬛ start test] to measure the sample's absorbency data and calculate the sample concentration, then display the data in the data list.

4.2.4 Rename sample

Select a sample in the data list, double-click the name to enter the edit status, input the name after the carriage return, and then click "Save".

4.2.5 Save data

1. Select the menu <File> <Save...> or click shortcut toolbar [⬛ Save...].

2. In the file saving dialog, change the file directory and file name, click <OK> button.

3. The quantitative analysis data file is saved as "*.qua" file.
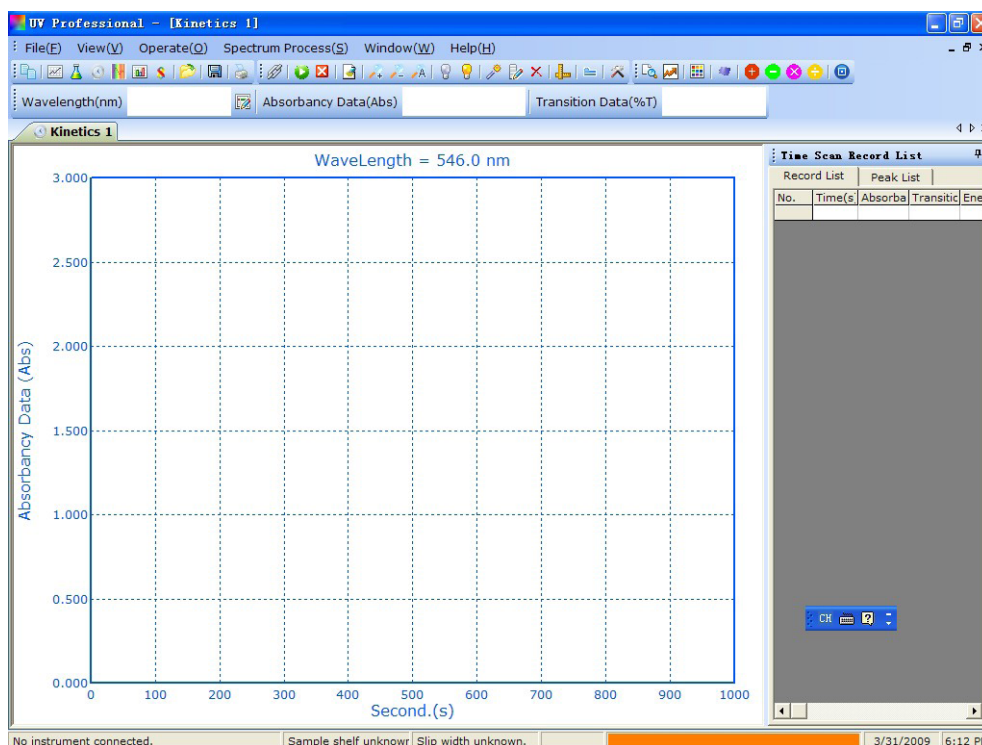
4.3 Time Scan

This chapter shows user how to do time scan measurement in the absorbance or transmittance mode.

4.3.1 Measurement

1. Click the shortcut toolbar [⬛ scan time], or <File>-> <time scan> Create a new time scan file.

2. Click shortcut toolbar [🖼 option], setup time scan parameters, select display mode, wavelength, start time, end time, time interval.

3. Click <OK> button to save configuration.

4. Put Blank sample into light path, select the menu <operation>-> <Set Blank> or click the

shortcut toolbar buttons [🖳 Set Blank(0.000 Abs/100.0%T)], Instrument will be set to the wanted wavelength, the data will be set to 0.000 Abs/100.0%T.

5. Put the sample into light path, select the menu <operation> <start test> or click the shortcut

toolbar buttons [start test] to start the time scan measurement.

6. All data will be drawn in the picture and display in the data list.

4.3.2 Change display mode

Shortcut Toolbar [Option], in the option window, select the Absorbance mode or Transmittance mode.

4.3.3 Save data

1. Select the menu <File> <Save...> or click shortcut toolbar [Save...].

2. In the save file dialog, change the file directory and file name, click <OK> button.

3. Test Data will be saved, and it is named in the format of "*.mul"

4.4 wavelength scan

This chapter shows user how to do wavelength scan with absorbency, transmittance or energy mode.
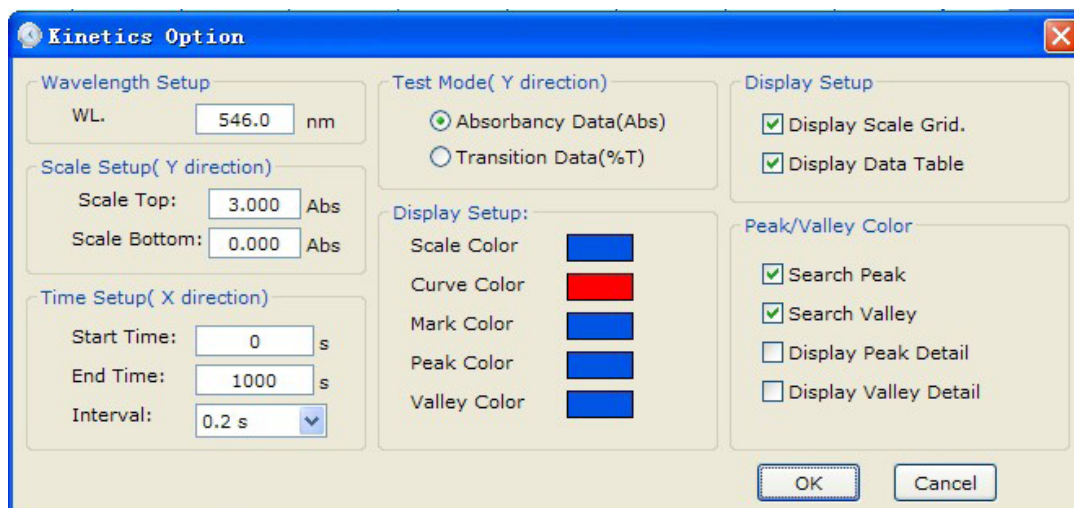
4.4.1 Measurement

1. Click on the shortcut toolbar [wavelength scan] or [file] [wavelength scan] to create new wavelength file.
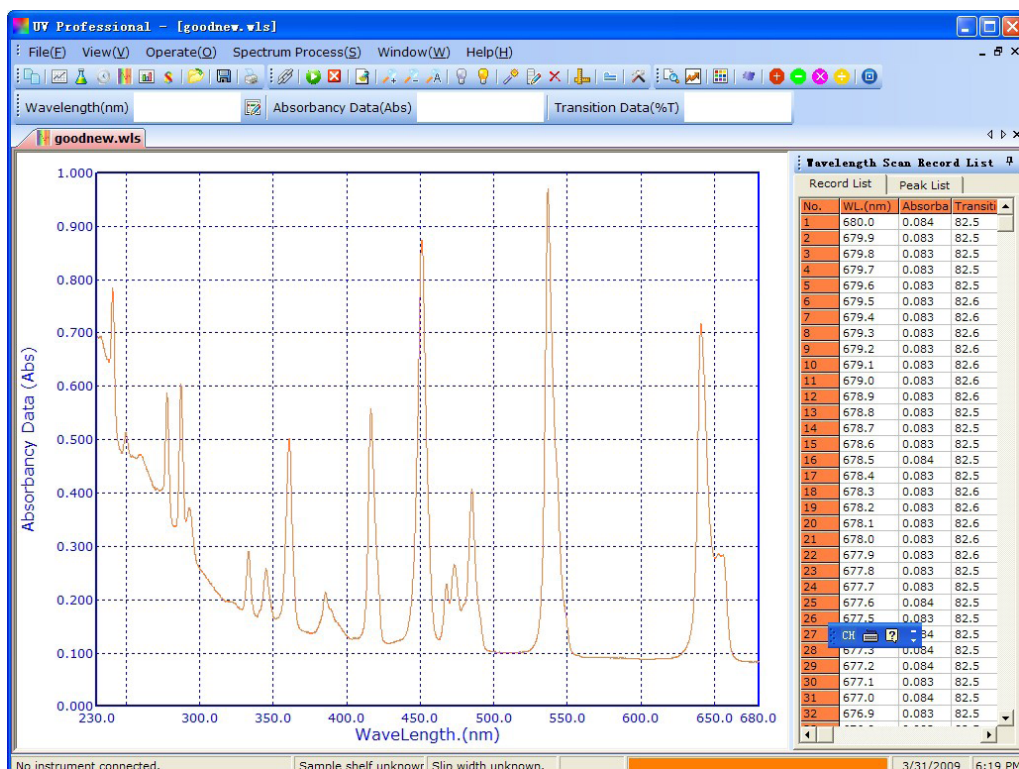
2. Select the main menu <operation> <set> or click the toolbar shortcut [📊 Settings], open the Preferences window wavelength scanning.
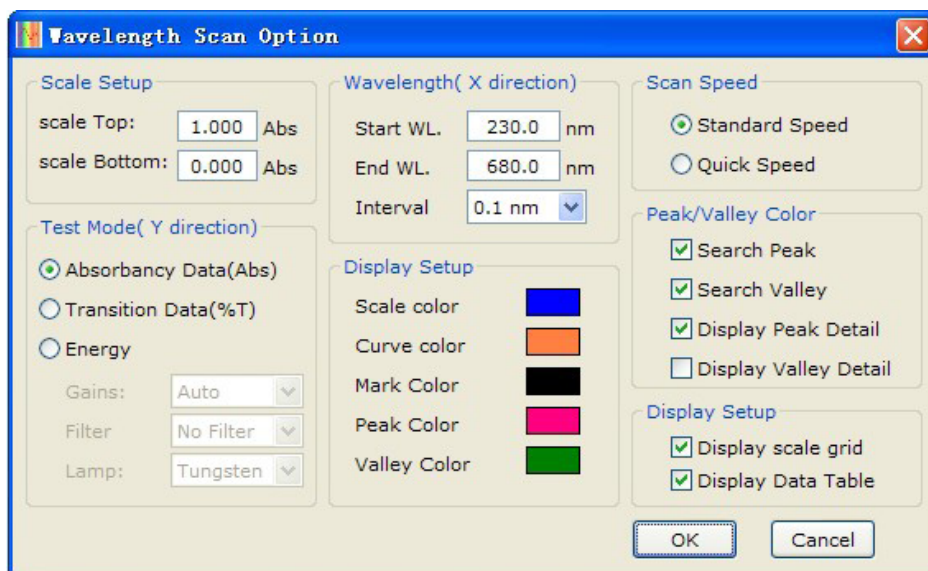
3. Select display mode (Select the energy scan mode, the proposal is set to a fixed Gain), scanning the wavelength range, coordinates the upper limit, lower limit coordinates and scanning interval.

4. Click OK to complete and exit Setup.

5. Will be placed in the reference light path.

6. Click on the shortcut toolbar [📏 system set up baseline] or <operator> "Create system baseline> Open dialog system baseline to begin scanning system baseline or to open the stored baseline for testing. Click [Start] button to start the baseline correction system.

Baseline correction system will take a few minutes, it is proposed that a longer time interval after baseline correction for a system to ensure testing accuracy. If you want to save the current system baseline, click [Save] button to save the current system baseline to a file. Click [Open] button to open the previously stored system baseline file.
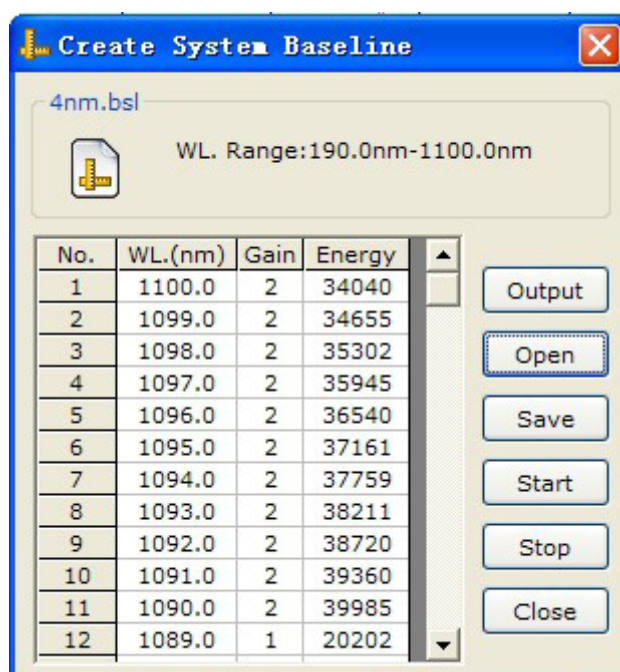
7. Put reference sample into light path, select the main menu <operation>-><zero / full-scale> or click the shortcut toolbar buttons [zero / full-scale], software will set lank(0.000Abs/100.0%T) within measurement wavelength range.

8. Put unknown sample into light path, select the main menu <operation>-><start test> or click the shortcut toolbar buttons [test] to start the test.

4.4.2 Switch display mode

Click shortcut toolbar click [Settings], open the option dialog to choose display mode (transition or absorbance).

4.4.3 Enlarge display area

In the wavelength scan option dialog, change the top limit and bottom limit, zoom in/out the display spectrum.

4.4.4 Peak search

Click the toolbar shortcut [search peak], after the search finished, the result will be in the list, peak value can be changed.

4.4.5 Save data

1. Select the main menu <File>-><Save> or click shortcut toolbar [Save].

2. In the file saving window, select file directory and Input file name, click <OK> button.

3. Test Data will be saved, and it is named in the format of "*.wls"

4.4.6 Save data for the picture or text file

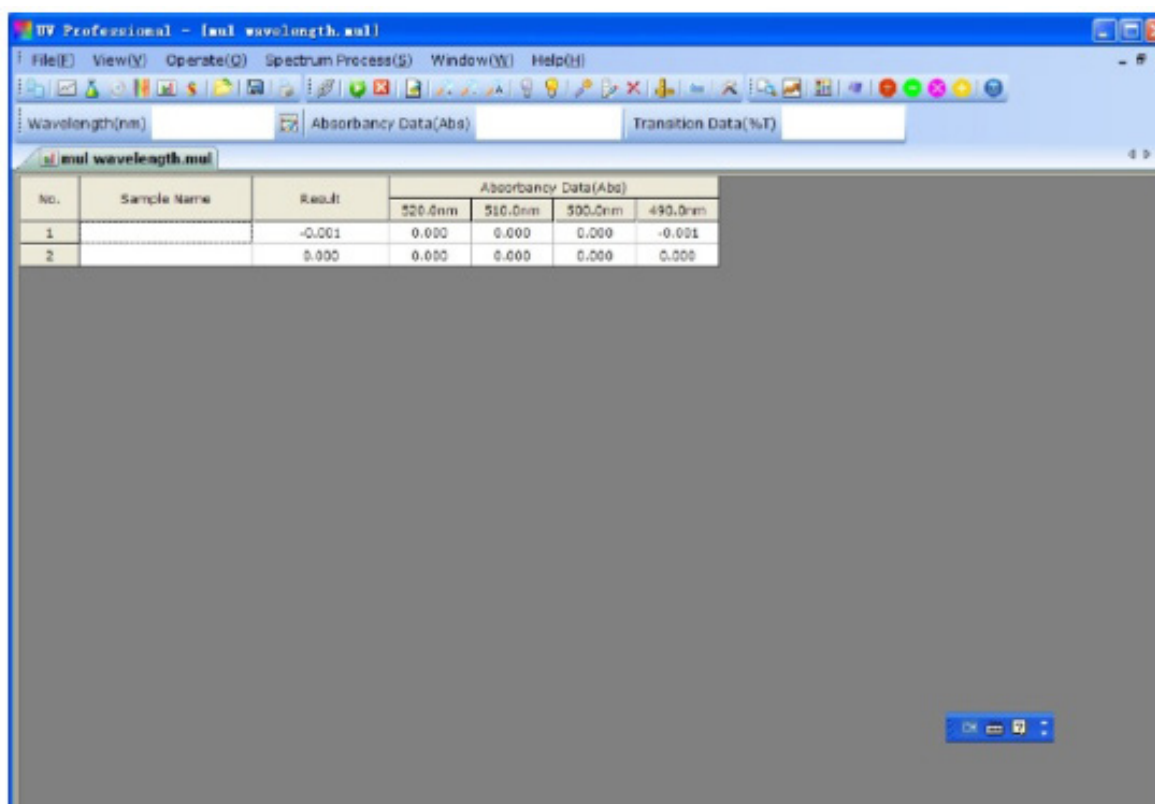Select <File>-><output> to save data for BMP bitmap file or text file txt.

4.5 Multi-Wavelength

This chapter shows user how to use multi-wavelength measurement method and to setup the multi-wavelength configuration.

4.5.1 Test

1. Select the main menu <File> <multi-wavelength> or click the toolbar shortcut

[multi-wavelength], create a multi-wavelength measurement.

2. Select the main menu <operation> <option> or click the toolbar shortcut [Settings], open multi-wavelength analysis of parameter settings window.

3. Input wavelength number,and Input coefficient: Results =Abs(wavelength 1)×factor 1 +Abs(wavelength 2)×factor 2 +Abs(wavelength 3)×factor 3 +...... 4. Click <OK> button to complete configuration. 5. Put reference sample into light path, select the main menu <operation> <set zero /full-scale> or

click the shortcut toolbar buttons [zero / full-scale], software will set 0.000Abs/100.0%T for each wavelength. This function requires several seconds or a few minutes. 6. Put sample into light path, select the main menu <operation> <start test> or click the shortcut

toolbar buttons [test] to start test.

4.5.2 Rename a sample

1. Select a named text box in the data list table.
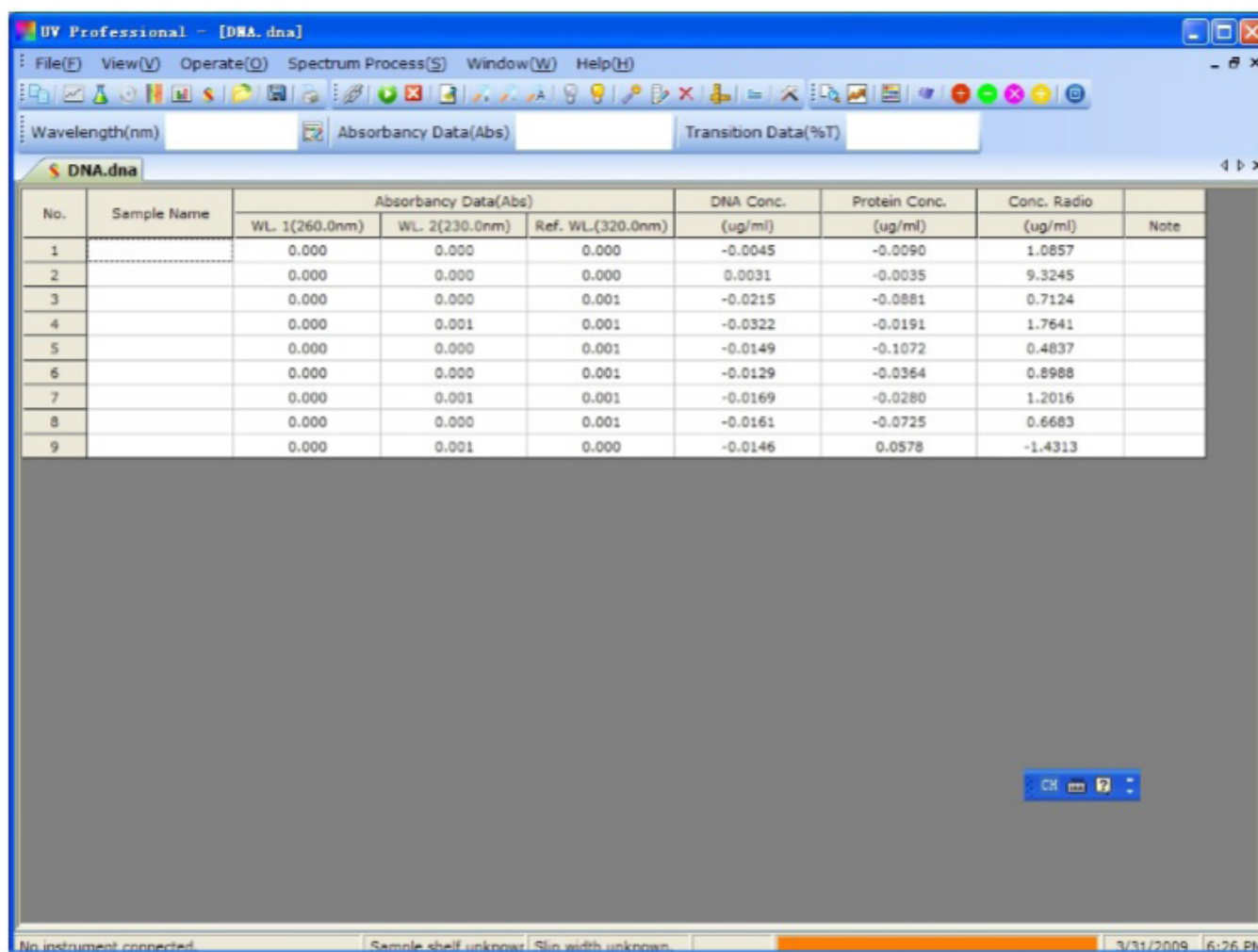
4.5.3 Save data

1. Select the main menu <File>-><Save> shortcut toolbar or click [💾 Save...].

2. In the file saving dialog, select file directory and input file name, click <OK> button.

3.Test Data will be saved, and it is named in the format of "*.mul"

4.6 DNA/ ProteinAnalysis

This chapter shows user how to do DNA/ protein measurement.
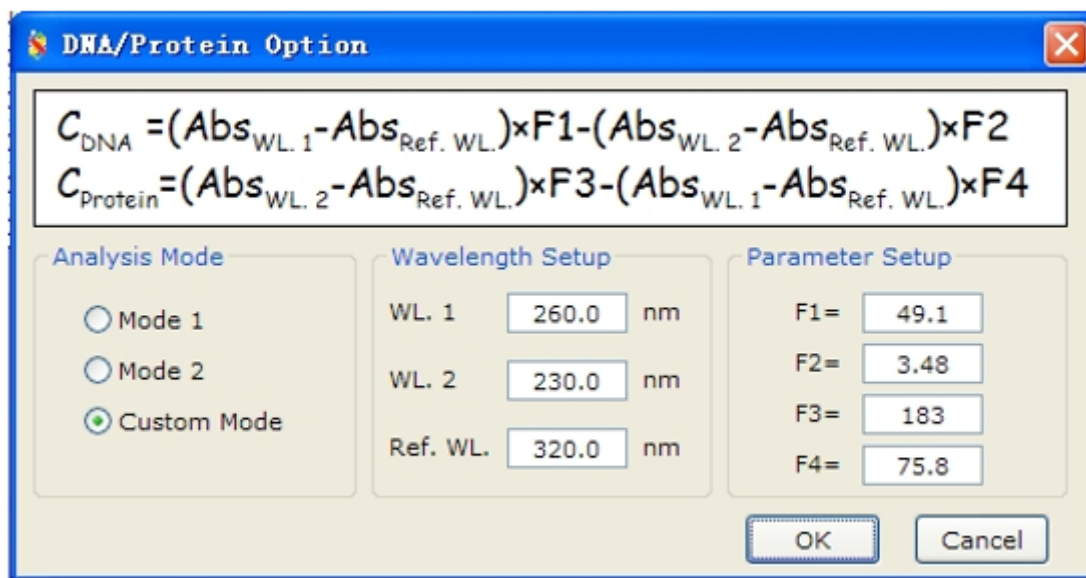
4.6.1 Test

1. Select the main menu <File>-><DNA/Protein> or click the toolbar shortcut [🔱 DNA / protein], create a DNA/ protein measurement file.

No.	Sample Name	Absorbancy Data(Abs)			DNA Conc.	Protein Conc.	Conc. Radio	
		WL. 1(260.0nm)	WL. 2(230.0nm)	Ref. WL.(320.0nm)	(ug/ml)	(ug/ml)	(ug/ml)	Note
1		0.000	0.000	0.000	-0.0045	-0.0090	1.0857	
2		0.000	0.000	0.000	0.0031	-0.0035	9.3245	
3		0.000	0.000	0.001	-0.0215	-0.0881	0.7124	
4		0.000	0.001	0.001	-0.0322	-0.0191	1.7641	
5		0.000	0.000	0.001	-0.0149	-0.1072	0.4837	
6		0.000	0.000	0.001	-0.0129	-0.0364	0.8988	
7		0.000	0.001	0.001	-0.0169	-0.0280	1.2016	
8		0.000	0.000	0.001	-0.0161	-0.0725	0.6683	
9		0.000	0.001	0.000	-0.0146	0.0578	-1.4313	

2. Select the main menu <operation>-><Option> or click the toolbar shortcut [🖼 Settings], open the DNA/ protein configuration dialog.

3. Select measurement method, the software have two built-in methods, you can also choose Custom method to input the test wavelength and coefficient.

DNA/Protein Option

$$C_{DNA} = (Abs_{WL. 1} - Abs_{Ref. WL.}) \times F1 - (Abs_{WL. 2} - Abs_{Ref. WL.}) \times F2$$
$$C_{Protein} = (Abs_{WL. 2} - Abs_{Ref. WL.}) \times F3 - (Abs_{WL. 1} - Abs_{Ref. WL.}) \times F4$$

Analysis Mode
- ○ Mode 1
- ○ Mode 2
- ⦿ Custom Mode

Wavelength Setup
WL. 1   260.0   nm
WL. 2   230.0   nm
Ref. WL.   320.0   nm

Parameter Setup
F1=   49.1
F2=   3.48
F3=   183
F4=   75.8

OK   Cancel

4. Click <OK> button to complete configuration.

6. Put reference sample into light path, select the main menu <operation>-><zero / full-scale> or

7.click the shortcut toolbar button [📖 zero /full-scale], software will set 0.000Abs/100.0%Tfor each wavelength.

8. Put sample into light path, select the main menu <operation> <start test> or click the shortcut toolbar button [➡ test] to start test

4.6.2 Rename a sample

1. Select a named text box in the data list table.

2. Double-click, Input the sample's name.

4.6.3 Save data

1. Select the main menu <File>-><Save> shortcut toolbar or click [Save…].

2. In the file saving dialog, select file directory and input file name, click <OK> button.

3.Test Data will be saved, and it is named in the format of "*.dna"

05 Other Features

This chapter shows the other features of UV Professional: set wavelength, set light switch wavelength, turn on/off tungsten lamp, turn on/off deuterium lamp, reset dark current.

5.1 set wavelength

Select main menu <operation>-><set wavelength> or click the toolbar shortcut [set wavelength], to set work wavelength, click <zero> button to set 0.000Abs/100.0%T for current wavelength.

5.2 Set lamp switch wavelength

Select main menu <operation>-><set lamp switch wavelength> or click the toolbar shortcut

[set lamp switch wavelength] to set lamp switch wavelength, the default value is between 300nm-400nm.

5.3 Turn on/off tungsten lamp

Select main menu <operation> <Turn on /off tungsten lamp> or click the toolbar shortcut /

[/ Turn on/off tungsten lamp] to turn on or turn off tungsten lamp

5.4 Turn on/off deuterium lamps

Select main menu <operation> <Turn on/off deuterium lamp> or click the toolbar shortcut /

[/ Turn on/offDeuterium lamp] to turn on or turn off D2 lamp

06 File Operation

Software file format description Photometry: *.bas

Quantitative: *. Qua

Time Scan: *. Kin

Wavelength scanning: *. Wls

Multi-wavelength: *. Mul

DNA/ protein: *. Dna

System baseline: *. Sbl

6.1 Save the test data

Select main menu <File>-><Save...> or click shortcut toolbar button [Save ...], to display file saving

dialog, input the file name, click <OK> button to save the test data file.

6.2 Open Test

Select main menu <File>-><open> or click the toolbar shortcut button [open ...], to display opening file dialog, select the file name, click <OK> button to open the file.

6.3 Print test reports

Select main menu <File> <print> or click the toolbar shortcut [Print ...] to print the test data or spectrum to current printer.

Appendix 1

DNA / Protein measurement methods:

$$C_{DNA} = (Abs_{WL.\ 1} - Abs_{Ref.\ WL.}) \times F1 - (Abs_{WL.\ 2} - Abs_{Ref.\ WL.}) \times F2$$
$$C_{Protein} = (Abs_{WL.\ 2} - Abs_{Ref.\ WL.}) \times F3 - (Abs_{WL.\ 1} - Abs_{Ref.\ WL.}) \times F4$$

Ratio= (Abs[WL.1] - Abs[ref. WL.]) / (Abs [WL. 2]-Abs[ref. WL.])

Method 1:

WL. 1 = 260nm, WL. 2 = 280nm, ref. WL. = 320nm F1=62.9   F2=36.0   F3=1552   F4=757.3

CDNA = (Abs[260nm]-Abs[320nm])×62.9-(Abs[280nm]-Abs[320nm])×36.0

CProtein=(Abs[280nm]-Abs[320nm])×1552-(Abs[260nm]-Abs[320nm])×757.3

Ratio= (Abs[260nm]-Abs[320nm]) / (Abs[280nm]-Abs[320nm])

Method 2:

WL. 1 = 260nm, WL. 2 = 230nm, ref. WL. = 320nm F1=49.1   F2=3.48   F3=183   F4=75.8

CDNA=(Abs[260nm]-Abs[320nm])×49.1-(Abs[230nm]-Abs[320nm])×3.48

CProtein=(Abs[230nm]-Abs[320nm])×183-(Abs[260nm]-Abs[320nm])×75.8

Ratio= (Abs[260nm]-Abs[320nm]) / (Abs[230nm]-Abs[320nm])

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