63 series spectrophotometers Protocol: P09-011A

Using water test analysis kits with the 63 series spectrophotometers

Introduction

The Jenway water analysis test kits are colorimetric kits for the determination of various ions and compounds in water. The Jenway Aquanova spectrophotometer is pre-programmed with parameters for each of the tests and is fitted with a cell holder to fit the various vials or cuvettes used for the tests. However it is possible to use these test kits on other Jenway spectrophotometers.

First it is necessary to decide whether, if using test kits, the tests are to be performed in the specified vials (either 16mm or 24mm diameter for Jenway kits). If so then it will be necessary to purchase and fit the Aquanova cell holder, part code 637 071. The other alternative is to measure the samples in 10mm square cuvettes for which no modifications to the instruments will be required; the test is carried out in the vial, following the kit instructions and a portion of the sample is simply be transferred from the vial to a cuvette.

Since the 63 series spectrophotometers are not pre-programmed with the test kit data, it will be necessary to determine the appropriate factors in order to calculate the sample concentrations. With the models 6300 and 6305, a factor can be calculated using a single standard in concentration mode. This will assume that the test gives a linear response over the concentration range. To check this, a series of standards can be measured in photometrics mode and a curve plotted manually in an Excel spread sheet. If the curve is not linear over the range then the unknowns will need to be calculated from this calibration curve.

With the models 6310 and 6315 standard solutions can be used to construct a calibration curve and the concentrations will be automatically calculated by the instrument.

Using the models 6300 and 6305 with the test kits

1. To use the test kits with the vials as detailed in the kit instructions, the unit should be fitted with the Aquanova cell holder (637 071).

2. Turn on the unit and wait until it has finished its self-test and has warmed up.

3. First, in the ABS mode, set the desired wavelength then place your blank sample in the instrument and press CAL. This will zero the spectrophotometer.

4. Next, to enter the Concentration mode, move the cursor at the bottom of the display to CONC using the right arrow key. The concentration of the blank should read zero.

5. To select the concentration units you require, move the cursor to UNITS and use the up and down arrow keys to scroll through.

6. Next, place the highest standard sample in the instrument. Press the CAL key and then use the up and down arrow keys to adjust the concentration value to that of the standard. Press the CAL key again to accept. This process will calculate a factor for the current absorbance value which you can view by scrolling across to xF and the factor will be displayed. This factor converts the absorbance to concentration based on the readings for the blank and the top standard.

7. Now you will be able to read unknown samples and the display will show the concentration, calculated automatically from the factor.

8. Follow the test kit instructions for your sample preparation.

Using the models 6310 and 6315 with the test kits

1. To use the test kits with the vials as detailed in the kit instructions, the unit should be fitted with the Aquanova cell holder (637 071).

2. Prepare a series of standards covering the concentration range of the samples to be measured.

3. Turn on the unit and wait until it has finished its self-test and has warmed up.

4. Select the Photometrics mode and set the wavelength to that required by the test kit.

5. Follow the test kit instructions for each standard. Measure and record the absorbance of each standard including a zero standard. This will give a set of calibration data.

6. Select the Quantitation mode and select Options. Click on Method and enter a method number. This can be 1-49. Make a note of the identity of each method number in order to identify the different methods.

7. Enter the test details i.e. wavelength, units, resolution. The number of standards needs to include the zero standard. Set the curve fit initially to linear+zero.

8. Press exit and scroll to the Standards Table. Enter the concentration value of the standards including the zero standard.

9. Press exit and scroll to the Absorbance Table. Enter the absorbance values of each of the standards including that of the zero standard measured in step 5.

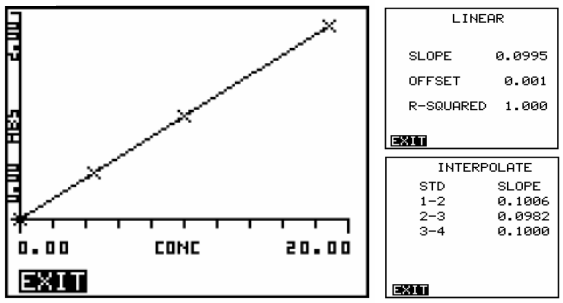
10. Press exit and view the curve. If the graph is not linear, edit the curve fit to interpolate. Exit to the measure screen.

11. Follow the test kit instructions and place the sample in the cell holder to measure the concentration.

12. When it is necessary to analyse further samples (i.e. the next day), switch the unit on and allow to warm up. Select the Quantitation mode and click on Method. The last used method will appear. If this is not the method required, enter the correct method number from those saved on the unit.

13. Follow the test kit instructions and place the sample in the cell holder to measure the concentration.

A



B

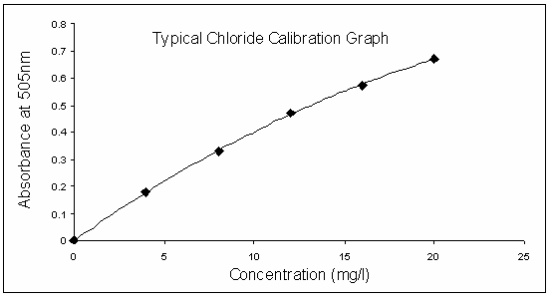


Figure 1: Example standard curves produced (A) by the model 6315 and (B) by plotting absorbance data of standards using Excel.