Shimadzu Atomic Absorption 7000

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Revision Number: 1

Date of Implementation:03/25/19

Last Reviewed Date: 03/25/19

1) OBJECTIVE

The following document describes the procedure on the operation of Shimadzu Atomic Absorption Spectrophotometer (AAS).

2) SCOPE

Atomic absorption spectroscopy (AAS) is a spectro-analytical procedure for the qualitative and quantitative determination of chemical elements employing the absorption of optical radiation (light) by free atoms in the gaseous state. In analytical chemistry the technique is used for determining the concentration of a particular element (the analyte) in a sample to be analyzed. AAS can be used to determine over 70 different elements in solution or directly in solid samples.

3) RESPONSIBILITIES

It is the responsibility of designated personnel in Research lab to train staff and students on this procedure and to ensure adherence to this procedure.

It is the responsibility of designated personnel (staff or Student) to follow the instructions of this procedure.

4) REFERENCES

AA-7000 Instruction Manual (Operation Guide) for Shimadzu Atomic Absorption Spectrophotometer.

Installation Procedure of WizAArd control software for Shimadzu Atomic Absorption Spectrophotometer.

5) DEFINITIONS

-Blank solution: Solution having only reagents, used for eliminating absorption by reagents.

-STD: Standard solutions

6) PRECAUTIONS

-Don't open the flame window when flame is on.

-Do not leave without closing the acetylene tank when not in use. Acetylene is explosive and quite dangerous.

7) PROCEDURE FOR OPERATING THE AA SPECTROPHOTOMETER

a) **Turning on the AAS**

i) Turn on the computer, Double click on the “WizAArd” shortcut on the desktop.
ii) The “Operation” tab should be highlighted. Click on the picture of the AAS.
iii) Enter “admin” for the user id and hit “ok”. (No password)
iv) The program opens with wizard selection.
v) Select the " element selection" Icon and press OK.
vi) Element selection window will appear.
vii) First click on the "select Element" Than load parameters will appear.
viii) In this select the required element e.g.: K(potassium) and press OK and then finish.
ix) Make sure that the Acetylene gas line pressure should be between 12 and 14 psi.
x) Turn on the AAS. (Power switch is on the front, lower right corner of the instrument.)
xi) From instrument drop down menu select the “Connect/Send Parameters” button. The program will proceed through an initialization checklist. When the program asks if you would like to test the safety parameters, click “no” and then “ok”. (You will need to do this 3 times. We run though all the safety checks once a week.)
xii) Instrument check list for Flame analysis will open. Tick all the boxes and press OK.
xiii) Igniting flame. Simultaneously press two buttons, ignite and Purge. The burner head will ignite.

b) **Software Operation.**

i) Open the main screen of the WizAArd program.
ii) Element selection (A): Use this dropdown box Parameters to select which element you are working with.
iii) From the Parameters drop down menu select Edit Parameters and then click on “Line Search. This usually takes a few minutes. When the line search finishes, a spectrum will appear with a red line crossing at the maximum. If the red line is not at the maximum, run the line search again.
iv) When this finishes, hit “Close”. and press OK on Edit parameter window.

c) **Data Collection**

i) AUTO ZERO, BLANK AND COLLECT DATA. Place the suction tube in DI water. Watch the Absorbance vs. time plot in the upper left corner of the screen (B). When the Abs level has stabilized, click on the “Auto Zero” button(F).
ii) Place the suction tube in your “0” concentration (blank) standard. When the Abs level has stabilized, click the “blank” button.
iii) Measure the absorbance of standards and unknowns according to the rows.
iv) To do this, select STD in the first column and press ok and place the suction nozzle in one of the solutions and aspirate. Once the Abs level has stabilized, click on the “Start” button. The instrument will wait 5 seconds and then collect data for 5 seconds (C). The results will then be displayed in the Measurement Results Table (E) (MRT).
v) Repeat step 4 for all the std solutions. Check the calibration curve displayed on the right upper of the window (D).
vi) To measure the sample in the MRT select UNK and then repeat step 4.

vii) Note down the concentration of unknown solution from MRT.

8) Shut Down Procedure

a) Press the "Extinguish" button on the front of the instrument.
b) Close the main tank valve on the acetylene tank.
c) Purge the line of acetylene by pressing the "Purge" button.
d) Close the air valve which is below the bench.
e) Make sure that both the meters are showing zero reading (One on the acetylene gas cylinder and one below the bench of AA instrument.
f) Turn off the power to the AAS. Exit out of the software.

NOTE: DO NOT LEAVE WITHOUT CLOSING THE ACETYLENE TANK. ACETYLENE IS EXPLOSIVE AND QUITE DANGEROUS.