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Radiometer ABL 825 Maintenance Procedure - Royal Oak

Document Type: Procedure

I. PURPOSE AND OBJECTIVE:

Routine maintenance is performed to monitor the instrument's performance and to keep the analyzer in operation. The purpose of this procedure is to provide staff with instructions and information on maintaining the Radiometer ABL 825.

II. SUPPLIES:

A. Inlet Gaskets
B. Pump Tubing
C. Hemoglobin Calibrators
D. Cal solutions 1 and 2
E. Cal Gases 1 and 2
F. Rinse solution
G. Waste Bottles
H. Rubber tube inlet
I. Membranes for each electrode
J. Hypochlorite solution
K. Cleaning solution

III. QUALITY CONTROL (QC):

A. **Measurement using AutoCheck Module.** AutoCheck Module holds 20 vials of QC material. The QC material is loaded into an autocheck carousel, which is manually loaded.
    1. Quality control will automatically run at selected timed intervals.
    2. Once QC is complete a printout of results will follow.
    3. Enter QC results into the Laboratory Information System (LIS).

4. Verify/Save the QC and enter actions for QC failures.
5. The parameter that is out of QC range will show as yellow .
6. Manually rerun the QC if it is out of range.
7. Troubleshoot if QC is still out of range.

B. **Manually initiate a QC program using the Autocheck Module**

1. Select **Anaylzer Status > Quality Control.**
2. Select the QC level to run.
3. Choose **Run AC Ampoule.**
4. QC will automatically run.
5. Verify QC results in the LIS

C. **Manual Quality Control measurement:** Before analyzing the Quality Control material,

1. Shake ampoule vigorously for at least 15 seconds.
2. Tap the top of the ampoule until all of the solution collects at the bottom and there are no air bubbles.
3. Place the ampoule in the ampoule opener and break off the ampoule neck.
4. Place the ampoule fully into the H700 adapter.
5. Open the syringe inlet flap.
6. Place the adapter tip up into the syringe inlet.
7. Press **Ampoule QC** to select the measuring program.
8. Press **Start.**
9. When prompted by the analyzer, remove the adapter and close the syringe inlet flap.
10. Results will print and transmit to LIS.
11. Accept QC and answer any QC failures.

IV. MAINTENANCE:

A. **Daily Maintenance**: **Check Solution Levels**

1. **Cal 1 and Cal 2 Solutions**
    a. Select **Analyzer Status > Reagents**
    b. Observe volume %'s of solution vials and observe how much liquid is actually in bottle.
    c. Replace Calibrator solutions if less than 10%.
    d. Replace, if necessary, for low volume solutions.
        i. Select **Replace** touch key.
        ii. Remove low volume bottle.
        iii. Date new bottle with Open and Expiration Date.
        iv. Scan lower barcode on new replacement bottle. Bottle that was scanned will show at the right side of screen.
        v. Place new bottle onto analyzer.

vi. “Press keyboard button and type initials in operator notes for documentation”

vii. Press **Restart.**

2. **Cleaning Solution**

Caution *– Do not breathe dust, avoid contact with skin. Irritating to eyes and skin. Wear suitable gloves. May cause sensitization by inhalation and skin contact. In case of accident or if you feel unwell, seek medical advice immediately. Show the label where possible.*

a. Select **Analyzer Status > Reagents.**

b. Observe volume %’s of solution vials and observe how much liquid is actually in bottle.

c. Replace cleaning solution if it is under 10%.

d. Replace if necessary for low volume solutions.

i. Remove the foil from the DosiCapZip.

ii. Turn the DosiCapZip upside down and screw it onto the container again. ***Caution****: If the contents of the DosiCapZip or the container have been split by accident, both the container and the DosiCapZip should be discarded to prevent incorrect concentrations in the solution.*

iii. Invert the container at least 20 times to dissolve the additive.

iv. Place the container horizontally so that the solution may enter the DosiCapZip and leave it for 3 minutes.

v. Invert the container again at least 20 times to fully dissolve the additive.

vi. Unscrew the lid from the new solution container.

vii. Remove the used solution container by holding it on the sides and pulling.

viii. Scan the barcode of the new solution, using the barcode reader.

ix. Place the new solution container in position on the analyzer and push it firmly onto the connector as far as possible.

x. Mark Open and Expiration date on container.

xi. “Press keyboard button and type initials in operator notes for documentation.”

xii. Press **Restart**.

3. **Rinse Solution**

a. Select **Analyzer Status > Reagents.**

b. Observe volume %’s of solution vials.

c. Change rinse solution when less than 5%.

d. Remove empty bottle.

e. Date new bottle with Open and Expiration date.

f. Scan the lower barcode on the new bottle.

g. Place onto analyzer.

h. “Press keyboard button and type initials in operator notes for documentation.”

i. Press **Restart.**

j. **Always keep empty Rinse bottles. These empty Rinse bottles are to be used as Waste bottles. Store with the empty waste containers.**

4. **Waste Bottles**
    a. Change the waste bottle only when prompted by the instrument.
    b. Instrument will prompt “Waste Container Full” and will go into an automatic Standby.
    c. Remove Waste bottle and replace with an empty Rinse Solution bottle or a new Waste bottle.
    d. Discard full waste bottle into biohazard.
    e. Choose **Exit Standby** and instrument will return to a Ready mode.
5. **Examine/Clean Inlet Gasket**
    a. Remove blue syringe and capillary inlet flaps.
    b. Observe inlet hole on gasket.
    c. Clean inlet hole with de-ionized water until no blood is seen.
    d. Clean syringe and capillary inlet flaps with de-ionized water.
    e. Replace inlet flaps onto analyzer.
    f. Select **Restart.**
6. Check Paper Supply
    a. Lift lid on paper cover.
    b. Observe paper supply.
    c. Change paper if necessary: Paper supply is low when pink lines appear on the side of the paper.
        i. Move the release lever fully back to the nearly horizontal position.
        ii. Remove any leftover paper from the printer.
        iii. Move the release lever forward.
        iv. Make sure that the paper edge is cleanly cut. Place the new roll into position in the printer so that the paper unreels from underneath the roll. The thermal side of the paper is on the outside of the roll.
        v. Aligning the leading edge of paper straight, feed it behind the drive roller. The paper will feed through the printer automatically once the internal sensor detects the edge of the paper.
        vi. Check that alignment is satisfactory. Realign as required.
        vii. Close the printer cover, making sure the paper feeds out of the printer.

B. **Weekly Maintenance**

1. **Clean and Replace Inlet Gasket**
    a. Remove electrode cover.
    b. WAIT for instrument to drain.
    c. Remove blue syringe and capillary inlet flaps.
    d. Push inlet probe upward and out of inlet gasket pathway (if necessary).

e. Lift inlet gasket straight up.

f. Set aside old gasket.

g. Obtain new gasket from ABL 825 supply storage cabinet.

h. Scan barcode to document lot/part number.

i. Type initials in operator notes.

j. Place new gasket onto ABL 825 firmly, making sure it is well secured into place.

k. Replace the inlet flaps.

l. Choose **Restart** touch key.

m. Soak old inlet gasket in Liqui-NOX® cleaner for 20 minutes, followed by soaking in water for 30 minutes.

n. Dry old clean gasket and place in ABL supply storage cabinet.

2. **Protein Removal (Deproteinization)**

a. Obtain Hypochlorite Solution, stored at 2-8°C.

b. Pull 1 cc (1 mL) of solution into syringe provided.

c. On Radiometer screen: Press **Menu – Start Programs.**

d. Choose **Auxiliary Programs.**

e. Select **Protein Removal.**

f. Open Inlet.

g. Place syringe at inlet gasket.

h. Press **Start.**

i. Instrument will return to Ready mode when completed.

C. **Monthly Maintenance**

1. **Replace Glucose and Lactate Membrane**

a. Lift electrode cover.

b. WAIT for instrument to drain.

c. Press the tab on the Glucose electrode housing cover to release the housing cover and expose electrode.

d. Remove Glucose electrode from analyzer.

e. Glucose membranes are stored at 2-8°C.

f. To remove the used electrode jacket, press the tabs on the sides of the jacket and pull.

g. Rinse the electrode with water, then shake it to remove the excess water.

h. Remove the protecting foil of a sealed electrode jacket in the Membrane Box by pulling upward.

i. Open a capsule of electrolyte solution and empty contents into the electrode jacket.

j. Press the electrode firmly into the electrode jacket until it clicks into place.

k. Remove the membraned electrode from the Membrane Box.

l. Dry the electrode contact and install the electrode in the analyzer.

m. Push the electrode housing closed gently; yet firmly, until you hear a click.

n. Close the electrode cover.

o. Select **Replace** and scan the barcode on the box and document with operator's initials.

p. Choose the **Restart** touch key.

q. Perform a 2-point calibration and QC if no other maintenance is needed.

2. **Replace Reference Membrane**

a. Lift electrode cover.

b. WAIT for instrument to drain.

c. Press the tab on the Reference Electrode housing cover to release the housing cover and expose the electrode.

d. To remove the used electrode jacket, hold firmly on the sides of the jacket and pull.

e. If the used O-ring remains on the electrode, remove it.

f. Remove the protecting foil of a sealed electrode jacket in the Membrane Box by pulling upward.

g. Press the electrode firmly into the electrode jacket, through the protective film, as far as possible.

h. Remove the membraned electrode from the Membrane Box.

i. Rinse the membraned electrode with water and dry with a lint-free tissue.

j. Dry the electrode contact and install the electrode in the analyzer.

k. Push the electrode housing closed gently; yet firmly, until you hear a click.

l. Close the electrode cover.

m. Choose the **Restart** touch key.

n. Perform a 2-point calibration and QC if no other maintenance is needed.

o. Document monthly maintenance with initials in operators notes.

D. **Quarterly Maintenance**

1. **Clean/Replace Fan Filter**

a. Locate the fan filter on the back right side of the analyzer.

b. Remove and dispose into trash.

c. Obtain new fan filter from the ABL 825 supply storage cabinet.

d. Place new fan filter into position on the back of the analyzer.

2. **Perform tHb Calibration**

a. Perform Cal 1 or Cal 2, if not done after the Protein Removal

b. Select **Status/Control** touch key.

c. Select **Calibration Programs** touch key.

d. Select **tHb Calibration** touch key.

e. Enter the bar code from the tHb Calibration Solution insert, using the bar code reader or the keyboard.

f. Tap the top of the tHb Calibration Solution ampoule to collect the liquid at the bottom and break off the ampoule neck, using the ampoule opener.

g. Put the ampoule in the black ampoule adapter.

h. Open the syringe inlet flap and place the adapter tip into the inlet.

i. Press the **Start** touch-key to aspirate the calibrating solution.

j. When prompted by the analyzer, remove the adapter and close the syringe inlet flap. Do not discard the calibrator ampoule, as it will be used for the calibration verification.

k. After measurement, a rinse is performed and then the analyzer returns to the Ready mode.

l. Verify the tHb Calibration:

   i. Open the syringe inlet flap and place the adapter with the tHB calibrator solution to the inlet.

   ii. Select **Syringe-S195 uL** or **Syringe-S85 uL** touch key.

   iii. Press the **Start** touch-key.

   iv. Remove the ampoule when prompted and close the inlet.

   v. If the calibration value is within the insert limits, the tHb calibration is accepted.

3. **Replace the Na, K and Cl (Sodium, Potassium and Chlorine) Electrode Membranes**

   a. Lift the electrode cover.

   b. WAIT for instrument to drain.

   c. Press the tab on electrode housing cover to release the housing cover and expose the electrode.

   d. Remove the electrode.

   e. To remove the used electrode jacket, press the tabs on the sides and pull.

   f. If salt deposits are present on the O-ring, rinse the electrode with water, then shake it to remove excess water.

   g. Remove the protecting foil of a sealed electrode jacket in the Membrane Box by pulling upward.

   h. Press the electrode firmly into the electrode jacket until it clicks into place.

   i. Remove the membraned electrode from the Membrane Box.

   j. Dry the electrode contact and install the electrode in the analyzer.

   k. Push the electrode housing closed gently; yet firmly, until you hear a click.

   l. Close electrode cover.

   m. Choose the **Restart** touch key.

   n. Perform a 2-point calibration if no other maintenance is needed.

4. **Replace the Ca++ (Calcium) Electrode Membrane:**

   a. Lift the electrode cover.

   b. WAIT for instrument to drain.

   c. Press the tab on electrode housing cover to release the housing cover and expose the electrode.

d. Remove the electrode.
e. To remove the used electrode jacket, press the tabs on the sides and pull.
f. Remove and discard the existing Ca membrane
g. Click the electrode into the new membrane unit.
h. Install the electrode in the analyzer.
i. Wait for the analyzer to complete calibration.
j. Verify the Ca performance using QC.

5. **Replace pO_2 (partial pressure of oxygen) Electrode Membrane**
   a. Lift electrode cover.
   b. WAIT for instrument to drain.
   c. Press the tab on the electrode housing cover to release the cover and expose the electrode.
   d. To remove the used electrode jacket, press the tabs on the sides and pull.
   e. Brush the electrode tip if the sensitivity exceeds 30pA/mmHg.
   f. Rinse the electrode with water, then shake it to remove excess water.
   g. Remove the protecting foil of a sealed electrode jacket in the Membrane Box by pulling upward.
   h. Press the electrode firmly into the electrode jacket until it clicks into place.
   i. Remove the membraned electrode from the Membrane Box. IMPORTANT: If air bubbles exist between electrode tip and membrane remove them by pressing tabs on electrode jacket and moving electrode slightly up and down until they disappear. Then press electrode firmly into electrode jacket.
   j. Dry the electrode contact and install the electrode into the analyzer.
   k. Push the electrode housing closed gently, yet firmly, until you hear a click.
   l. Close electrode cover.
   m. Choose the **Restart** touch key.
   n. Perform a 2-point calibration and QC if no other maintenance is needed.

6. **Replace pCO_2 (partial pressure of carbon dioxide) Electrode Membrane**
   a. Lift electrode cover.
   b. WAIT for instrument to drain.
   c. Press the tab on the electrode housing cover to release the cover and expose the electrode.
   d. To remove the used electrode jacket, press the tabs on the sides and pull.
   e. Rinse the electrode with water, then shake it to remove excess water.
   f. Remove the protecting foil of a sealed electrode jacket in the Membrane Box by pulling upward.
   g. Press the electrode firmly into the electrode jacket until it clicks into place.
   h. Remove the membraned electrode from the Membrane Box. IMPORTANT: If air bubbles exist between electrode tip and membrane, remove them by pressing tabs on the electrode jacket and moving electrode slightly up and down until they disappear. Then press electrode firmly into jacket.

i. Dry the electrode contact and install the electrode in the analyzer.

j. Push the electrode housing closed gently; yet firmly until you hear a click.

k. Close the electrode cover.

l. Choose **Restart** touch key.

m. Perform a 2-point calibration and QC is no other maintenance is needed.

E. **Six Month Maintenance**

1. **Replace Electrode Module Pump Tubing**

a. Enter the HOLD mode by lifting the electrode cover.

b. WAIT for instrument to drain.

c. Disconnect the ends of the tube from the connectors.

d. Gripping one end of the tube, free the fastener from the fastener slot by pulling upward.

e. Pull upward to free the remainder of the tube from around the pump rotor and the other fastening slot.

f. Place a new pump tube around the pump rotor.

g. Secure the upper fastener of end of tube in the fastening slot.

h. Gripping the other fastener, wrap the tube around the pump rotor. Secure the other fastener in the other fastening slot.

i. Press the Rotate Pumps touch-key to turn the pump and seat the tubing into position.

j. Attach the ends of the tube to the connectors, pushing the tube onto the connector as far as possible.

k. Close the lid on the electrode cover.

l. Select the **Restart** touch-key.

2. **Replace Solutions Pump Tubing**

a. Enter the HOLD mode by lifting the electrode cover.

b. WAIT for instrument to drain.

c. Remove the pump clamp and disconnect the ends of the old tube from the connectors.

d. Gripping one end of the tube, free the right fastener from the fastener slot by first pulling outward and then lifting upward.

e. Pull upward to free the remainder of the old tube from around the pump rotor and out of the other fastening slot.

f. Secure the fastener of the left-short-end of the new tube in the fastening slot. The short end of the tube is to be on the left, the long end on the right.

g. Gripping the longer fastener, wrap the new tube around the pump rotor. Secure the fastener in the other fastening slot.

h. Press the **Rotate Pumps** touch-key to turn the pump and seat the tube.

i. Attach the ends of the tube to the connectors, pushing the tube onto the connector as far as possible.

j. Slide a new pump clamp (supplied with the pump tubes) over the right side connector so that it is seated over the enlarged portion of the tube end, then clamp it shut.

k. Select the **Restart** touch-key.

3. **Replace the Waste Pump Tubes**

a. Enter the HOLD mode by lifting the electrode cover.

b. WAIT for instrument to drain.

c. Gripping one end of the tube, free the right fastener from the fastener slot by first pulling outward and then lifting upward.

d. Pull upward to free the remainder of the old tube from around the pump rotor and out of the other fastening slot.

e. Remove the lower tube in the same manner.

f. Take the short end of the one of the new tubes and place the fastener into the lower right side fastening slot.

g. Gripping the other fastener, wrap the tube around the pump rotor. Secure the fastener in the lower left side fastening slot.

h. Select the **Rotate Pumps** touch-key.

i. Connect the right end of the new tube to one of the right-side connectors and the left end of the tube to one of the left-side connectors. Ensure that tube ends are pressed completely onto the connectors.

j. Repeat steps f through i (above) with the other tube except securing the tube fasteners in the upper fastening slots.

k. Select the **Restart** touch-key.

F. **As Needed Maintenance**

1. **Cleaning Procedure**
2. Select **Auxiliary Programs** touch key.
3. Select **Cleaning** touch key.
4. Analyzer will return to Ready mode when finished.
5. This also MUST be done immediately after an EDTA specimen has been analyzed.

V. TROUBLESHOOTING TECHNIQUES:

A. **Clots:** The following problems are due to clots from specimens

1. Rinse dripping out of the inlet gasket.
2. “Sample error” on printout when trying to analyze a sample.
3. “Sample integrity” on printout when trying to analyze a sample.
4. Failed membrane, indicated in “yellow’ on the instrument. If there is a failed membrane, clean the membrane chamber first before performing the clot removal procedure.

a. Enter the HOLD mode by lifting the electrode cover.

b. Remove the failed membrane from the chamber.

c. Using a cotton applicator stick, moisten with water and clean inside the chamber.

d. Using a dry cotton applicator stick, dry the chamber.

e. Put the electrode back into the chamber.

f. Close the cover and choose **Restart** touch key.

g. Once in Ready mode, perform the Clot Removal procedure as follows.

B. If a clot is suspected, perform **Clot Removal Procedure** as follows;

1. Perform a Cleaning procedure.
2. Perform a Tube refill.
3. Perform a Liquid sensor adjust.
4. Perform a Pump calibration.
5. Perform a 2-point calibration.
6. Run 3 levels of QC.

C. Once this is completed and the instrument still fails, call Radiometer customer support. The # is located on the front of the instrument.

VI. SHUTDOWN PROCEDURE:

A. If you need to turn off the Radiometer ABL 825, do not use the ON/OFF switch that is located on the back of the instrument. Use the Shutdown Procedure as follows:

1. Powering down instrument is used for troubleshooting techniques.
2. Choose **Menu**.
3. **Utilities**.
4. **Power Down.**
5. Confirm Power Down, wait until screen displays. It is safe to turn of computer."
6. Turn the power switch to OFF, which is located on the back of the instrument.
7. Wait one minute, turn instrument back on.

VII. REFERENCES:

1. Radiometer Medical A/S, ABL 800 Series Operator's Manual, 2008.
2. Radiometer Medical A/S, ABL 800 Series Reference Manual, 2008.

Attachments

No Attachments

Approval Signatures

Step Description	Approver	Date
Medical Director	Ann Marie Blenc: System Med Dir, Hematopath	11/18/2021
Policy and Forms Steering Committee Approval (if needed)	Gail Juleff: Project Mgr Policy	11/18/2021
Policy and Forms Steering Committee Approval (if needed)	Colette Kessler: Mgr Laboratory	10/12/2021
Lab Chemistry Best Practice Committee	Elizabeth Sykes: System Med Dir, Chemistry	10/12/2021
Lab Chemistry Best Practice Committee	Nga Yeung Tang: Tech Dir, Clin Chemistry, Path	10/7/2021
	Colette Kessler: Mgr Laboratory	10/6/2021

Applicability

Royal Oak