Title: Maintenance and Storage of Dissolved Oxygen and pH Probes

SOP Number: 12118 **Revision Number: 04**

Supersedes: Revision 03 **Effective Date:** JUL 2 0 2015

[redacted]

Originator/Date:

Approval/Date:

Approval/Date:

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1.0 Purpose

This Standard Operating Procedure (SOP) describes the maintenance and storage procedures for dissolved oxygen probes.

2.0 Scope

This SOP applies to Production personnel using reusable vessel mounted Dissolved Oxygen and pH Probes in BOP Upstream Production Areas.

This procedure is made available through federal funds from the National Cancer Institute, NIH, under contract HHSN261200800001E.

3.0 Authority and Responsibility

3.1 The Director, Late Process Sciences, Biopharmaceutical Development Program (BDP) has the authority to define this procedure.

3.2 The Manager, Large Scale Manufacturing, BDP is responsible for training personnel in this procedure and for documenting this training to Biopharmaceutical Quality Assurance (BQA).

3.3 The Area Supervisor, or designee(s), is responsible for the implementation of this procedure.

3.4 BQA is responsible for quality oversight of this operation.

4.0 Materials

4.1 Mettler Toledo pO2 membrane kit, BDP PN 20894 (Large DO probes), or BDP PN 21718 (Small probes)

4.2 Broadley-James pO2 membrane kit, BDP PN 20894

4.3 Broadley-James replacement cathode, pO2, BDP PN 21332

4.4 Oxy-probe polarizer (either cordless or corded style)

4.5 Broadley-James pH probe replacement kit, BDP PN 20554

4.6 pH Storage Solution, BDP PN 20632

5.0 Evaluation of Dissolved Oxygen Sensors

5.1 Prior to being placed into service for a run, perform a visual inspection.

5.2 Check for holes in the membrane tip and the condition of the outer cylinder O-ring.

5.3 The membrane must be replaced if there is a hole in it or media has migrated into the probe interior.

5.4 Failure of a probe to standardize or poor response and performance during a run also necessitates membrane replacement. It is recommended that for mammalian cell culture purposes, DO probes should have their membranes changed every 1-2 runs. The probe's response to testing prior to a run will help decide whether or not to replace the membrane.

5.5 The membrane must be replaced during product changeover.

6.0 Replacing Membranes

6.1 Unscrew the end cap from the sensor shaft and pull it from the electrode.

6.2 Pull the membrane cartridge off the anode/cathode assembly and discard membrane cartridge.

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6.3 Rinse the anode/cathode assembly with WFI and dry it with a piece of tissue paper.

Note: Dark, irregular color of the silver anode inhibits probe function. If present, clean per manufacturer's instructions with a soft brush and rinse completely with WFI.

6.4 Replace all O-rings and elastomers.

6.5 Completely fill the membrane cartridge with polarographic oxygen electrolyte. Avoid touching the membrane. Gently tap the cap until air bubbles have been removed from the electrolyte.

6.6 With the membrane cartridge in a vertical position and the sensor positioned over the cap with the slot in the silver anode facing away from the operator, slip the membrane cartridge onto the anode/cathode assembly. Work any air away from the silicone sleeve. Allow air and excess electrolyte to escape from the anode groove. Continue pushing the membrane cartridge until it reaches the trapezoidal washer (if present).

6.7 Wipe away any expelled electrolyte solution from the electrode. Make sure that no electrolyte remains between the membrane cartridge and the trapezoidal washer.

6.8 Carefully slip the end cap over the fitted membrane cartridge and screw it into place.

6.9 Affix a label to the probe indicating "membrane changed", initials, and date.

6.10 Attach the polarizer, and allow the probe to polarize for at least 2 hours before use.

7.0 Storage of Dissolved Oxygen Sensors

7.1 When not in use, connect probes to a polarizer.

7.2 Store probes dry in such a fashion to protect the delicate membrane from damage.

8.0 Evaluation of pH Probes

8.1 Prior to being placed into service for a run, perform a visual inspection.

8.2 Check for cracks in the glass that would compromise the ability of the probe to operate.

8.3 Failure of a probe to standardize or poor response and performance during a run also necessitates replacement of the probe.

9.0 Replacing a pH Probe

9.1 Unscrew the lock nut at the top of the probe housing.

9.2 Remove the pH probe from the housing and replace with an equal unit.

9.3 Replace all O-rings inside the housing, which are included in the pH probe replacement kit.

10.0 Storage of pH Probes

10.1 When not in use probes should be stored in a volume of pH storage solution to cover the exposed probe section.

10.2 pH storage solution should be changed on a monthly basis.

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11.0 Documentation

11.1 Document cleaning on Form 12149-01 as per ***SOP 12149, General Cleaning of Process Equipment***.

11.2 Document maintenance such as membrane replacement in the fermentor/bioreactor logbook where the probe is used per ***SOP 21531, Equipment/Facility Logs***.

12.0 References and Related Documents

12.1 **SOP 12149** *General Cleaning of Process Equipment*

12.2 **SOP 21531** *Equipment/Facility Logs*

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