CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2014
DateRun:	06/23/2014
Experimenters:	Jason Marshall
ClientType:	Cleaner Manufacturer
ProjectNumber:	Project #1
Substrates:	Liquid
PartType:	Coupon
Contaminants:	None
Cleaning Methods:	
Analytical Methods:	Surfactant Titration
Purpose:	Create SOP for quality control of disinfectant product
Experimental Procedure:	Products: MOLDEX Disinfectant Concentrate • EPA Reg Number 1839-169-82480 • EPA Est. No. 67874-MA-1 MOLDEX Disinfectant (RTU) • EPA Reg Number 1839-83-82480 • EPA Est. No. 67874-MA-1 Step 1. - Electrode Preparation When you receive the Nitrate ISE you screw in one of the Nitrate tips into the body of the electrode...it has an O ring attached. After you assemble the Nitrate ISE electrode, soak the tip in the 0.02 N sodium lauryl sulfate solution to condition it. The tip starts out dry and the plastic membrane at the bottom needs to be conditioned at least one hour. Check reference electrode (yellow) fluid levels. NOTE: don't use a KNO3 solution as the outer filling solution that comes with the 900200 electrode - contains Nitrate that will interfere with readings Inner solution – green Unscrew top back piece from yellow body Slide the cap and spring up the wire Push the inner section down so the tip pops out of the bottom Slide the inner section down until the small hole is exposed There will be a off-white sleeve covering the filling hole, slide it down to open the hole Using the green solution remove cap and inner red plug Attach white cover with dispensing nozzle Squeeze bottle until the inner tube is filled to just below the hole Recover the hole Slide inner tube back into electrode housing Slide spring and cap back down and tighten Remove the blue plug from the outer section of the electrode Using the 3M (or 4M) KCl (clear solution), remove cover and red plug Attach second white cover with dispensing nozzle Squeeze bottle until the tube is filled to just below the hole Leave the blue plug out of the probe during testing Place both probes into holders on stand Lower holder so that both probes are submersed into a small beaker containing the 0.02 N SDS solution (made up as outlined below) Allow to soak for at least an hour Step 2. - Preparation of sodium dodecyl sulfate (SDS) Titrant (which is also referred to as sodium lauryl sulfate) (Use VMR benzethonium chloride and VMR specially pure SDS) Benzethonium Chloride Dry >2.5 grams of benzethonium chloride (hyamine 1622) at 105 C for 30 minutes Let cool in dry location Weigh out 2.3-2.4 g of benzethonium chloride (+/-0.1 mg). Record weight Add to a 250 ml volumetric flask Dilute with DI water Take a 10 ml sample of this stock solution and add 80 ml DI water Check pH of this 100ml of solution that will be titrated below If below 10.5, adjust using a 0.02N NaOH solution. (if over 10.5 add 1-3 drops 0.02N HCL) Sodium dodecyl sulfate (SDS) Stock Solution Weigh 5.7 – 5.8 grams of sodium dodecyl sulfate (+/-0.1 mg) Add to 1000 ml volumetric flask Dilute to volume with DI water

CLEANING LABORATORY EVALUATION SUMMARY

Check approximate N (Normality) by dividing weight by molecular weight
~5.7g/288.37 g/mole = ~0.01976 moles per liter

Titration to determine exact N (Normality) of SDS Titration Solution
Titrate with the same procedure as the product batch testing
Place beaker on stirring platform (after adding the 100ml of benzethonium chloride solution from above)
Insert electrodes
Titrate with the ~0.02 N SDS solution
Calculation of the actual N (Normality) of the SDS solution
N SDS = (Hyamine*10*4)/(448*(SDS volume titrated)

SDS Normality =
(Hyamine, g)*(10) *(4)
448 *(SDS, mL)

Input of exact SDS N into the Excel Data entry for Quaternary QC Testing
1. Put SDS N (Normality) into the appropriate Tab 1 Cells of both the RTU Quat QC Data Entry, and, CONCENTRATE Quat QC Data Entry
2. The updated Tab 1 Master is then subsequently copied into each additional Tab used for each Quat batch to be tested with this specific SDS titration solution
3. A new batch of SDS titration solution should be made every 1-2 weeks

Step 3. - Burette Preparation
Fill burette with 0.02 N SDS solution (previously made and checked for concentration levels)
Place a waste collection beaker under the burette and open the stopcock
Allow fluid to flow out of the tip for 1-2 seconds to ensure air pockets are removed
If no flow happens, gently tap the burette just below the stopcock to help induce flow
Once flow is obtained close stopcock
Record starting volume on the graduated burette

Step 4A - Sample Preparation for CONCENTRATE
Using an electronic balance, tare 250 volumetric flask
Add accurately weighed sample of the batch (+/- 0.1 mg)
~20-30 grams for the CONCENTRATE product
Dilute sample to 250 ml using deionized, distilled or bottled water
(order of water source preference)
(Bottled water has been used for the QC titrations)
Cover and invert bottle a couple of times to help mix the solution
Take a 10 ml sample of dilution and place in a 250 ml beaker
Add 80 ml of water (or buffer solution if available)
Add stir bar
Check pH
pH should be 10.5
If lower than 10.5 add 1-3 drops 0.02N NaOH, mix and measure again
If higher than 10.5 add 1-3 drops 0.02N HCL, mix and measure again
Place beaker on stir plate, add stir bar and turn on stirring action
Want a steady non-vortex rate of mixing, adjust rate if necessary
Lower electrodes into solution
Tips should be just under the solution
The black electrode should not be submersed beyond grey tip
Turn on meter
Make sure reading mV (not pH)
To change to mV press mode button
Allow mV reading to stabilize
When ready, record mV reading
Titrate by opening the stopcock slowly, dispensing about 3-4 drops at a time (0.1 mL)
Record mL added to beaker
Record the mV level after addition
Titrate until the mV has a significant drop (70-80 mV drop)
Conduct 7-8 more additions beyond this drop
Enter results into Excel sheet

SDS Normality for Concentrate =
(Hyamine, g)*(10) *(4)
384 *(SDS, mL)

* The MW for the active Quat in the Concentrate is 343

Step 4B - Sample Preparation for RTU
Using an electronic balance, tare 250 volumetric flask
Add accurately weighed sample of the batch (+/- 0.1 mg)
~35 grams for the RTU product
Add 80 ml of water (or buffer solution if available)
Add stir bar
Check pH
pH should be 10.5
If lower than 10.5 add 1-3 drops 0.02N NaOH, mix and measure again
If higher than 10.5 add 1-3 drops 0.02N HCL, mix and measure again
Place beaker on stir plate, add stir bar and turn on stirring action
Want a steady non-vortex rate of mixing, adjust rate if necessary

CLEANING LABORATORY EVALUATION SUMMARY

Lower electrodes into solution
Tips should be just under the solution
The black electrode should not be submersed beyond grey tip
Turn on meter
Make sure reading mV (not pH)
To change to mV press mode button
Allow mV reading to stabilize
When ready, record mV reading
Titrate by opening the stopcock slowly, dispensing about 3-4 drops at a time (0.1 mL)
Record mL added to beaker
Record the mV level after addition
Titrate until the mV has a significant drop (70-80 mV drop)
Conduct 7-8 more additions beyond this drop
Enter results into Excel sheet

SDS Normality for RTU undiluted sample (does not need to be multiplied by 4 like the Benzethonium Chloride or the SDS Normality for the Concentrate) =
(Hyamine, g)*(10)
384 *(SDS, mL)

* The MW for the active Quat in the RTU is 384

Step 5 - At the end of testing
Remove electrodes from solution in beaker and rinse with water
Blot dry and close the blue plug on the yellow reference electrode
Turn off meter
Turn and unplug stir plate
Store the probes in 0.02 N SDS solution for up to a week
If not using probe within a week, drain fluids from both chambers and store empty probes in supplied box
Empty the burette and discard the remaining SDS burette solution
Close the stopcock and fill 1/3 full with water
Empty stopcock and allow water to flow out of the burette into a waste beaker

Results:

Summary:

Conclusion: