Ethanolamines/Glycol Ethers
Tier 3 Procedure

Section Number: 1
Issue Number: 2.0
Original Date: 06-21-91 **Author:** Tim Dill
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Title: Dowfroth Mode Start-Up
References: Glossary Of Equipment Identification (Text # 114)

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1 Dowfroth Mode Start Up

1.0 Objective:

1.1 To achieve plant start up on dowfroth series without damage to equipment or injury to personnel.

2.0 Responsibility:

2.1 It is the responsibility of the operations supervision and the senior operations specialist to ensure that this procedure is fully complied with.

2.2 It is the responsibility of the senior operations specialist and the operations specialist to do this job safely, according to procedure and to complete all checklists.

2.3 Things to do before mode change:

_____2.3.1 Call analyzer technician to schedule shutting down t-115 analyzer.

_____2.3.2 Mix and pump catalyst.

_____2.3.3 Bring dv-104 level down to 65%.

_____2.3.4 Pump dv-143a to dv-114/dv-115 to get level down to 10,000 pounds.

_____2.3.5 Run gas chromatograph and koh on dv-114/115.

_____2.3.6 Have dv-122a/b levels as low as possible for the time of mode swap.

_____2.3.7 Pump 20,000 pounds of dpm to dv-132a/b for recycle.

_____2.3.8 If plant is down at start-up, put all bottoms pumps on their own seal flush.

_____2.3.9 Blow out 3" pm transfer line and block in at dv-125, dv-145 and area i.

4.0 Procedure:

_____1.4.1 Set reactor shell pressure at 105 pounds per square inch gauge. Raise pressure as fast as the pressure will increase. Put 475 pound steam on both reactors to get the pressure up as soon as possible. Put 235 pound steam on e-110 and block in the reactor steam. Once the reactor pressure is up to 105 pounds put it to d-510 and shut off the 475 pound steam to the reactor shells. The 235 pound steam to e-110 is necessary at this time only when switching from high pm to the dowfroth mode.

_____1.4.2 Line up e-110 condensate to the low pressure header.

_____1.4.3 Once the reactor pressure is at or close to 105 pounds, start a catalyst and acid flow. Start a pm and dpm recycle flow and begin ramping rates to the pre-determined settings. Ramp time should be one hour. If we are switching from high pm to dowfroth, the recycle flow from dv-143's must be shut off. Swap the line-0-logic to the flow from d-106a/b. This must be done before shutting off the flow from dv-143's. Control r-103 differential at 30 to 40 % of chart.

_____1.4.4 If carryover to d-180 is high, notify environmental operations and make the necessary adjustments but do not allow d-180 to overflow to the sump.

_____1.4.5 Run extra catalyst from p-106's for a while because the catalyst From dv-114 will be diluted in dv-122's until the system has cleared out of high pm production. (600 + pounds of catalyst)

_____1.4.6 Once the rate change is complete the 235 pound steam to e-110 can be cut back and eventually cut off.

_____1.4.7 Pump all good check tanks to storage and isolate dv-122 piping to storage with chain and seal. Close all check tank double block and bleeds until ready to pump good dowfroth series tanks.

_____1.4.8 We should be able to make good pm from t-115 overheads for 1 to 2 hours after rate change is started. When the pm load to t-115 is reduced we need to discontinue trying to make good pm and begin lowering t-115 pressure to 200mmhg and raise the control temperature to remove the pm in t-120 bottoms. Swap t-115 overheads, then sample and pump good tank to storage then isolate. Note: when lowering t-120 pressure it is very important to do it slowly. Monitor e-125 to e-121 temperature closely and do not let this temperature peg off the chart. This will reduce the possibility of carryover to the vacuum pump and hot well. Call environmental operations and inform them of the tod, and that this flow will not be a large amount of pounds. Shutdown t-115 and isolate it from the process by hanging tags.

_____1.4.9 Once we are making good product all check tanks and associated piping will need to be flushed out and pumped to dv115 only. Pumping bad check tanks to dv-114 will upset the finishing end by changing the recycle concentration too rapidly.

4.0 Procedure: Cont'd.

_____1.4.10 Ensure that the valve upstream of the dv-115 to dv-122a/b flow control loop is closed. This valve bypasses the entire control loop.

_____1.4.11 Sset catalyst recycle flow from dv-115 to dv-122. Control dv-122 level by adjusting recycle or rerun flows.

_____1.4.12 Restart d-180 after t-140 is lined out.

_____1.4.13 Once we are through using e-113 the cooling tower water can be cut back leaving a small amount of flow to it. This water can be used in other parts of the plant.

Operator: _____

Date: _____

L Sos: _____

5.0 General Operating Conditions:

5.1 T-110 conditions:

A. Pressure is 760 mmhg.
B. Zero steam flow.
C. Zero overheads flow.

5.2 T-120 conditions:

A 475 steam (steam product ratio about .85).
B. Control point is tray 19 about 120 deg c.
C. Overheads flow 5500 to 6500 depending on rates.
D. Steam flow 4500 to 5500 depending on rates.
E. Pressure 200 mmhg.

5.3 T-130 conditions:

A. 475# steam (steam product ratio about .40)
B. Control point is tray 4 at about 185 deg c.
C. Overhead flow 8000 to 10000 depending on rates.
D. Steam flow 3500 to 4500 depending on rates.
E. Pressure 40 mmhg.

5.4 T-140 conditions:

A. Steam/product ratio about .22.
B. Steam flow about 1500.
C. Temperature set point around 180 degrees.
D. Pressure 40 mmhg.
E. Reflux around 3500.

6.0 Dowfroth Mode Rates With Normal Concentration In DV-114/115.

6.1 Rates:

Po----------10000
Methanol---------- 8000
Catalyst---------- 600
Pm Recycle---------16000
Dpm Recycle---------1500
Dv104 Drop----------500 - 600
R-103 Delta----------30% - 40%

6.2 Production:

T-120 Overheads ----5500
T-130 Overheads ---10500
T-140 Overheads -----6700
T-140 Bottoms -------4000

7.0 Dowfroth Mode Rates With No Recycle From DV-115:

7.1 Rates:

Po----------10000
Ratio---------- 1.62
Pm Recycle---------- 9600
Dpm Recycle---------- 5200
Catalyst---------- 150
Acid---------- 120

7.2 Production:

T-120 Overheads---------- 5500
T-130 Overheads----------10000
T-140 Overheads---------- 6000
T-140 Bottoms---------- 4800

7.3 Note:

A. Dv-104 level drop approx. 1500 pounds.
B. If the salt in 40 bottoms goes above 3.6 adjust the ratio to 1.55 and reduce the pm recycle be 500 pounds.
C. When all columns are running put p-110 and p-120 on t-130 overhead seal flush.

8.0 Dowfroth Instrument Checksheet:

_____1.8.1 Type SWITCH on the PDP-11. Change mode to Dowfroth

_____1.8.2 Notify office professional of mode swap so she can change the reactor concentration _____

_____1.8.3 Change vax to dowfroth mode_____

Operator: _____

Date: _____

I sos: _____

9.0 Revisions

Revision 1 3/22/95 Reworded 1.8.1