

CHLOR - ALKALI 2

1994

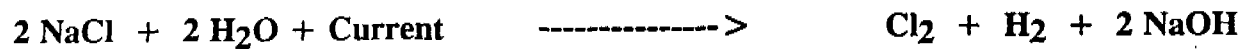
REACTIVE CHEMICALS REVIEW

CELL AREA

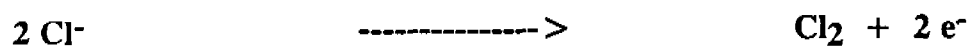
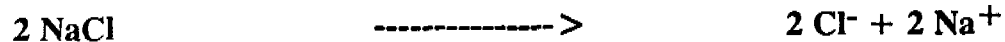
DO A 046059
CONFIDENTIAL

CELL AREA CHEMICAL REACTIONS

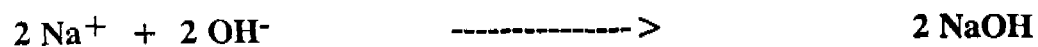
TOTAL CELL:



MAIN REACTIONS IN ANODE:



MAIN REACTIONS IN CATHODE:



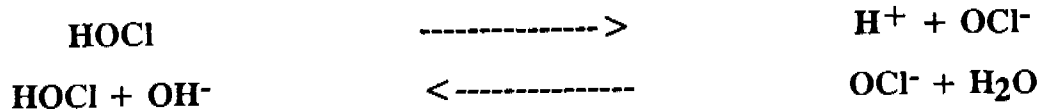
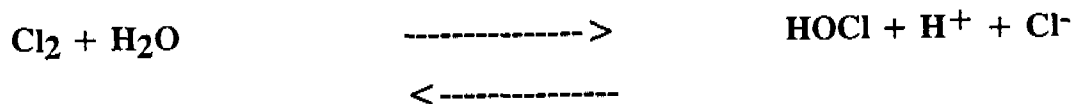
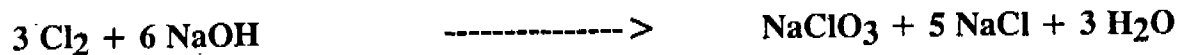
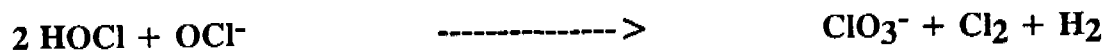
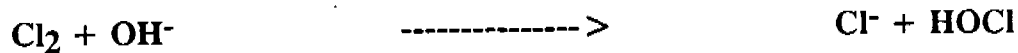
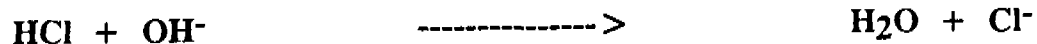
DO A 046060
CONFIDENTIAL

Dow Confidential

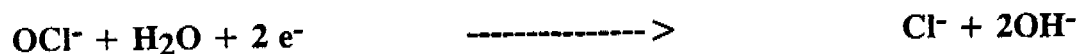
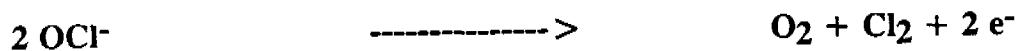
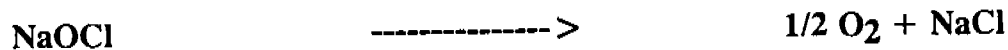
09/28/94

CELL AREA CHEMICAL REACTIONS

SIDE REACTIONS IN ANODE:



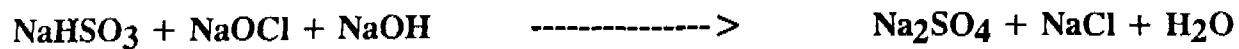
SIDE REACTIONS IN CATHODE:



DO A 046061
CONFIDENTIAL

CELL AREA
CHEMICAL REACTIONS

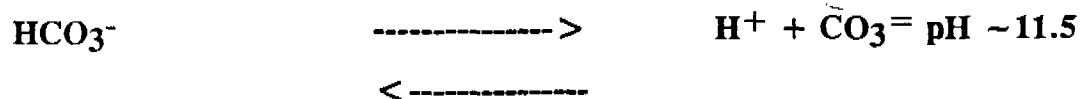
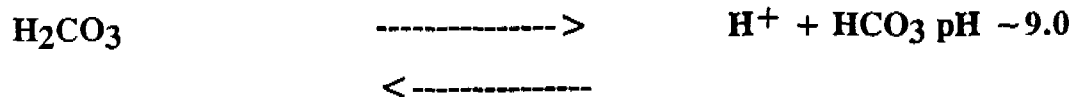
SODIUM BISULFITE ADDITION:



SODIUM THIOSULFATE ADDITION:



CELL WASH REACTIONS:

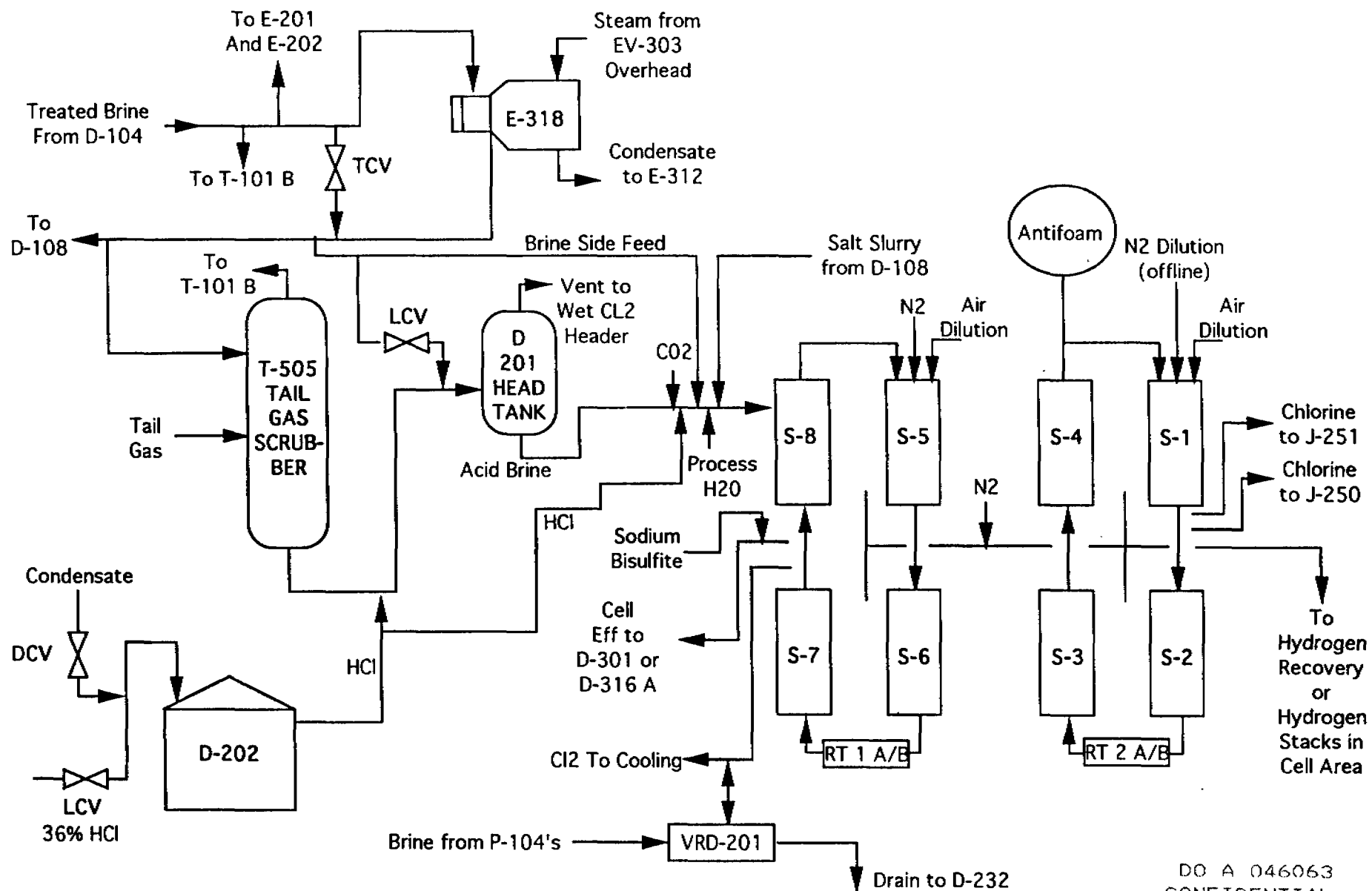


DO A 046062
CONFIDENTIAL

Dow Confidential

09/28/94

CELL AREA



CELL AREA RAW MATERIALS

RAW MATERIALS:

Brine	(Saturated)
Electric Current	68,000 AMPS/Circuit Maximum
HCl	16 %
Salt Slurry	

PRODUCTS:

Chlorine Gas	95 %
Hydrogen Gas	99 %
Cell Effluent	10 %

DO A 046064
CONFIDENTIAL

Dow Confidential

07/17/92

Chlorine Cells

Result: Hydrogen in Chlorine Explosion; Arcing within cell

- 2 level transmitters and 1 low level carbon probe
- 4" rectifier shutdown (2/3, 2/2, 1/1)
- backup side feed level controller
- low level alarms

- 6" minimum operating head
- VRD conforming to CATC guidelines
- Level selection - high reading at >16"
low reading at < 16"
- visual rounds

Result: Hydrogen in Chlorine Explosion

- 2 series relief on hydrogen stack at 4.5 - 6.0 "
- high H2 pressure alarm at 4"
- foam drains

DO A 046065
CONFIDENTIAL

Potential Problem: High Hydrogen During Operation

Result: Hydrogen in Chlorine Explosion

Preventative Measures:

- 2" air dilution valves
- open air dilution valves between 0.5 and 1.0%
- "quickie H2" and "total gas H2" analyzers
- Trouble shooting
 - plugged radial feeders
 - take salt off (300 gpl max salt)
 - look for restricted H2 outlets
 - bad cells
- Follow CATC guideline concerning air dilution and shutdown
- series voltage alarm to detect possible clip drop voltage prob.
- clip drop profiles quarterly by cell crew
- anolyte and catholyte temperature alarms > 80 C

October 6, 1994
Dow Confidential Information
efp

DO A 046066
CONFIDENTIAL

Potential Problems Oxygen in hydrogen

Result: Explosion in hydrogen header ("pop" if minor in nature)

Incidents:

- 1993 Mod5 code problem resulted in no N2 purge on shutdown which lead to an explosion S-5/S-8 @ CA-2
- 1993 CA-2 Hydrogen log fire due to arcing at boot connection on S-8 hydrogen log caused by ground on series
- 1994 S-4 at Cl-1 plant; failure to bottle series before lowering head to stop under-cell leak.
- 1994 S-5 at Cl-1 between cell leak caused loss of catholyte level; H2 ignited above caustic trap.

Preventative Measures:

- Nitrogen purge activated in startup/shutdown steps for the hydrogen stacks
- Low nitrogen flow alarm at 200 lb/hr; normal rate 500 lb/hr
- Nitrogen valve position alarms
- hydrogen compressor shutdown -1.5 INWA instantaneous or 1/8 INWA for 2 seconds
- standard operating procedure to "bottle" series on all shutdowns (purges the cell with brine)
- off-line procedures for cell maintenance
- cell sprayers and housekeeping

October 6, 1994
Dow Confidential Information
efp

DO A 046067
CONFIDENTIAL

LIST OF CRITICAL INSTRUMENTS IN THE CELL AREA

<u>DESCRIPTION</u>	<u>ALARM SETPOINT</u>	<u>FREQUENCY CHECKED</u>
16 pH probes (2 on each series, one on east end and one on west end)	High - 4.3 pH Low - 1.5 pH	Weekly
8 LSH carbon probes (1 on each series)	High - 18 inches	Monthly
8 LSL carbon probes (1 on each series)	Low - 4.0 inches	Monthly
16 level transmitters (2 on each series, one on east end and one on west end)	High - 19 inches Low - 55 inches Low Low - 50 inches Low Shutdown - 40 inches	Monthly
Quickie hydrogen analyzer (Takes one stream off each series)	High - 0.5 % High High - 1 %	Monthly
2 Sump 1 level transmitters (1 transmitter for CKT 1 side and 1 for CKT 2 side)	High - 87 % Low - 10 %	Semi-Annually
2 Sump 1 LSH level switches (1 switch for CKT 1 side and 1 for CKT 2 side)	High - 90 %	Semi-Annually
2 Sump 1 LSL level switches (1 switch for CKT 1 side and 1 for CKT 2 side)	Low - 15 %	Semi-Annually

DO A 046068
CONFIDENTIAL