

Personnel
Interviews

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CONFIDENTIAL

Chl r-Alkali II Plant Personnel Reactive Chemical Interview Questions

1. (A) A LOSS OF ANOLYTE LEVEL IN THE CHLORINE CELLS WOULD RESULT IN WHAT REACTIVE CHEMICAL CONCERN?

(B) WHAT ARE THE PREVENTATIVE MEASURES TO AVOID THIS?

Correct	
<u>OS</u>	<u>SOS</u>

(A) A chlorine/hydrogen explosion.

1/1	2/2
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(B) - Generator trips at 2.5 inch level.

1/1	2/2
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- 2 level transmitters and low level carbon probe - critical instrument. Y

Y	YY
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- Mod 5 voting logic (2/3, 2/2, 1/1) - but not carbon probe.

2. HOW IS HYDROGEN BACKFLOW FROM THE HYDROGEN COLLECTION SYSTEM TO THE CELLS PREVENTED?

Correct	
<u>OS</u>	<u>SOS</u>

1/1	2/2
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- Discharge EBV closes upon hydrogen compressor trip.

Y

- T-206 will vent gas in train.

Y	YY
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- Individual stacks at cells backup T-206.

Y	YY
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3. (A) WHAT WOULD HAPPEN IF OXYGEN GOT INTO THE HYDROGEN HEADER?

(B) WHAT ARE THE PREVENTATIVE MEASURES TO AVOID THIS?

Correct	
<u>OS</u>	<u>SOS</u>

1/1	2/2
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(A) An explosion would occur (a "pop," if minor in nature).

Y	YY
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0/1	1/2
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(B) - Nitrogen purge activated in startup/shutdown steps for the hydrogen stacks.

Y	YY
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- Low nitrogen flow alarm at 200 lb/hour (normal rate 500 lb/hour).

Y

- Nitrogen valve position alarms.

- Hydrogen compressor shutdown - 1.5 INWA instantaneous or 1/8 INWA for 2 seconds.

Y

- Standard operating procedure to "bottle" series on all shutdowns (purges the cell with brine).

- Off-line procedures for cell maintenance.

- Cell sprayers and housekeeping.

4. (A) WHAT WOULD HAPPEN IF THE 2ND/3RD STAGE CHLORINE COMPRESSOR DISCHARGE TEMPERATURE GOT TOO HIGH?

(B) HOW IS THIS PREVENTED?

Correct	
<u>OS</u>	<u>SOS</u>

(A) A chlorine / iron fire.

1/1	2/2
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1/1	2/2
-----	-----

(B) - Compressor trips at 325 degrees F on either stage.

Y	YY
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- Triple redundant temperatures on each stage.

Y	YY
---	----

- Mod 5 voting logic.

5. WEAK H₂SO₄ IS VERY CORROSIVE WHEN CONTACTED WITH STEEL. HOW ARE THE DRYING TOWERS PROTECTED FROM CORROSION?

	Correct	
	<u>OS</u>	<u>SOS</u>
	1/1	2/2
- The first drying tower, T-201, is a CPVC lined vessel.	Y	YY
- Acid strengths / flows / temperature are monitored in both drying towers.	Y	Y
- Tray temperatures are monitored in both towers.	Y	Y

6. HOW IS A NITROGEN TRICHLORIDE EXPLOSION IN THE TAFFY POTS PREVENTED?

	Correct	
	<u>OS</u>	<u>SOS</u>
	1/1	2/2
- Monitor and alarm temperature in each pot (redundant).	Y	YY
- Alarm rate of temperature rise in pots.		Y
- Analyze brine for NH ₃ content weekly at GBO.		
- Analyze taffy bi-weekly for NCl ₃ .	Y	YY
- Monitor and alarm pressure on each pot (redundant).		Y
- Lowered PSV setting to 150# to catch pot overpressure.		Y
- Maintain 40 ppm / 150 ppm hypochlorite in the brine at Chlorine 1.		
- Maintain level below 40% to allow room for diluent should a reaction occur.	Y	Y
- Capability to automatically add liquid chlorine to the taffy pot in the event of a reaction. Also have capability to add CCl ₄ to pots.	Y	YY
- Reboiler temperature controlled to decompose NCl ₃ . Given 40 psig operating pressure, reboiler temperature set point is 170 degrees F, over 30 degrees below the boiling point of diluent, CCl ₄ .		YY
- Pressure transmitter and an alarm for high pressure "rate of rise" on transfer line.		

7. WATER / MOIST AIR ENTERING THE LIQUEFACTION PROCESS FROM BRINE SCRUBBER WILL CREATE A SEVERE CORROSION PROBLEM. HOW IS THIS PREVENTED?

	Correct	
	<u>OS</u>	<u>SOS</u>
	1/1	2/2
- Check valve installation on tail gas line to scrubber.		Y
- High pressure alarm on brine scrubber.	Y	Y
- Moisture analyzer and alarm on T-505 tail gas inlet line.		YY
- Liquefaction startup and shutdown procedures, on computer, call for blinding the liquefaction process from the brine scrubber when liquefaction is to be depressured.	Y	

8. HOW IS NCl₃ ACCUMULATION IN THE EVAPORATOR BOTTOMS PREVENTED?

	Correct	
	<u>OS</u>	<u>SOS</u>
	1/1	2/2
Flush evaporator bottoms once daily to T-204.	Y	YY

9. WHAT CONCENTRATION OF HYDROGEN CAN FORM AN EXPLOSIVE MIXTURE WITH CHLORINE?

Correct	
<u>OS</u>	<u>SOS</u>
1/1	2/2
Y	YY

(>4%

10. (A) IF CHLORINE GOT INTO THE FREON SYSTEM, WOULD THERE BE A REACTION?
(B) WHY?

Correct	
<u>OS</u>	<u>SOS</u>
1/1	2/2
1/1	2/2
Y	YY

(A) Yes.

(B) Even though Freon is not specifically reactive with chlorine, the Freon system often contains trace levels of oil/organic compounds which are reactive with chlorine.

11. WEAK SULFURIC ACID <95% AND CONCENTRATED SULFURIC ACID >98% REACT VIOLENTLY WITH STEEL AND OTHER METALS. WHAT ARE THE 2 CONCERNS OF THIS REACTION?

Correct	
<u>OS</u>	<u>SOS</u>
1/1	1/2
Y	Y

Severe corrosion and evolution of flammable hydrogen gas.

12. WHICH OF THE FOLLOWING ARE REACTIVE?

Correct	
<u>OS</u>	<u>SOS</u>
1/1	2/2
Y	YY
Y	YY
Y	YY
Y	YY
Y	YY
Y	YY
Y	YY
Y	YY
Y	YY

- | | |
|--|-----|
| (A) Wet chlorine + steel | yes |
| (B) Wet chlorine + titanium | no |
| (C) Dry chlorine + titanium | yes |
| (D) Chlorine + ammonia | yes |
| (E) Chlorine + pure Freon | no |
| (F) Chlorine + organic compounds | yes |
| (G) Hydrogen + oxygen | yes |
| (H) Sulfuric acid + organics | yes |
| (I) Oxygen + greases | yes |
| (J) Chloroethene + copper-containing compounds | yes |

OS scored 96 % correct.
SOS's scored 92 and 96% correct.

Caustic Plant Personnel Reactive Chemical Interview Questions

- | | |
|---|---|
| <p>(1. WHAT IS THE REACTIVE CHEMICAL CONCERN OF MIXING CAUSTIC WITH ACIDS LIKE SULFURIC AND HYDROCHLORIC ACID?</p> <p style="padding-left: 40px;">Caustic reacts violently/explosively with acids.</p> | <p>Correct</p> <p><u>OS</u> <u>SOS</u></p> <p>2/2 1/1</p> |
| <p>2. WHAT ARE SOME METALS THAT REACT RAPIDLY WITH CAUSTIC?</p> <p style="padding-left: 40px;">Aluminum, tin, copper, zinc, bronze, brass.</p> | <p>Correct</p> <p><u>OS</u> <u>SOS</u></p> <p>2/2 1/1</p> |
| <p>3. (A) WHAT IS THE REACTIVE CHEMICAL CONCERN OF MIXING 50% CAUSTIC AND WATER?</p> <p style="padding-left: 40px;">(B) SHOULD CAUSTIC BE ADDED TO WATER, OR WATER TO CAUSTIC?</p> <p style="padding-left: 80px;">(A) Exothermic heat of dilution..</p> <p style="padding-left: 80px;">(B) Add caustic to water</p> | <p>Correct</p> <p><u>OS</u> <u>SOS</u></p> <p>2/2 1/1</p> <p>1/2 1/1</p> |
| <p>4. UNDER WHAT CONDITIONS DOES CAUSTIC REACT RAPIDLY WITH STEEL?</p> <p style="padding-left: 40px;">At elevated temperatures (120 - 150 degrees F)</p> | <p>Correct</p> <p><u>OS</u> <u>SOS</u></p> <p>2/2 1/1</p> |
| <p>5. HOW IS CONTAMINATION OF THE UTILITY SYSTEMS PREVENTED?</p> <p style="padding-left: 40px;">Double block and bleeds used at all cross tie points.</p> | <p>Correct</p> <p><u>OS</u> <u>SOS</u></p> <p>1/2 1/1</p> |
| <p>6. HOW IS CORROSION OF NICKEL CLAD VESSELS BY HYPOCHLORITES IN THE CELL EFFLUENT FEED PREVENTED?</p> <p style="padding-left: 40px;">Cell effluent is analyzed for hypochlorites. Hypochlorites are neutralized with sodium bisulfite.</p> | <p>Correct</p> <p><u>OS</u> <u>SOS</u></p> <p>1/2 1/1</p> |
| <p>7. WHAT ARE THE CONCERNS OF WELDING ON PIPING AND EQUIPMENT CONTAINING RESIDUAL CAUSTIC?</p> <p style="padding-left: 40px;">Embrittlement, stress cracking, and evolution of flammable hydrogen gas.</p> | <p>Correct</p> <p><u>OS</u> <u>SOS</u></p> <p>1/2 1/1</p> |
| <p>8. WHAT SHOULD BE DONE TO EQUIPMENT CONTAINING RESIDUAL CAUSTIC PRIOR TO WELDING?</p> <p style="padding-left: 40px;">Metal surfaces must be cleaned/acidized prior to welding, cutting, or other forms of heat treatment.</p> | <p>Correct</p> <p><u>OS</u> <u>SOS</u></p> <p>2/2 1/1</p> |

OS's scored 100% and 58% correct.
SOS scored 100% correct.