

RE/Gen CC-22

A Sodium Chlorate Based Regeneration Method for Cupric Chloride Final Etching

Product Description

RE/Gen CC-Series Etchants are concentrated, buffered sodium chlorate solutions designed to economically and safely regenerate cupric chloride etching systems utilizing the VIS-U-ETCH automated replenishment system. The use of sodium chlorate versus chlorine gas as the “regenerative” oxidizer, provides several safety advantages; most important of which is the elimination of chlorine gas storage and reduced potential for chlorine gas generation during replenishment.

Performance Features

- CC-SERIES ETCHANTS eliminate the need for chlorine gas storage, and when operated properly, significantly reduces the risk of generating chlorine gas.
- In most processes, CC-SERIES ETCHANTS and the VIS-U-ETCH automated replenishment system are a drop-in replacement for chlorine gas systems.

Physical Specifications

Parameter	CC-15	CC-22	CC-28
Physical State	Liquid	Liquid	Liquid
Appearance	Water White Solution	Water White Solution	Water White Solution
Odor	Mild Bleach	Mild Bleach	Mild Bleach
Stability	Stable	Stable	Stable
Freeze/Thaw Stability	Keep From Freezing	Keep From Freezing	Keep From Freezing
Specific Gravity	1.1	1.2	1.2
pH	5-6 (Neat)	5-6 (Neat)	5-6 (Neat)

Equipment Requirements

Tanks: Constructed Of Polypropylene, PVC Or CPVC.

Heaters: Quartz, Titanium, Teflon Or Teflon/Plastisol Encased Steel.

Racks: Constructed of Polypropylene, Titanium Or Plastisol Coated Steel.

Cooling Coils: Constructed Of Polypropylene, Teflon Or Teflon/Plastisol Coated Steel.

Ventilation: Required

Agitation: Conveyorized Spray Only.

Filtration: Depending On The Acid Normality Of Operation, Continuous Carbon Filtration Is Recommended.

Technical Data Sheet

Product Make-Up

Parameter	Range	CC-15	CC-22	CC-28
Copper - As Metal - oz./gal (g/L)	24 - 27 (180 - 240)	26 (195)	29 (218)	32 (240)
Hydrochloric Acid (N)	0.04 - 0.08	0.04	0.04	0.04
Specific Gravity	1.330 - 1.450	1.330	1.380	1.450

The following procedure is for a 100 gallon bath (378.5 liters) prepared at the recommended concentrations. Should you desire to operate at concentrations other than those recommended, you will be required to make volume adjustments accordingly.

Procedure

1. Thoroughly rinse the tank and inspect for cleanliness paying special attention to the heaters and heater sheathings, and cooling coils.
2. Fill the tank to 75 gallons with ELECTROLESS GRADE CUPRIC CHLORIDE, 25 OPG.
3. Add 10.3 gallons of HYDROCHLORIC ACID, 37%.
4. Dilute to volume with ELECTROLESS GRADE CUPRIC CHLORIDE, 25 OPG.
5. Connect the VIS-U-ETCH Controller and add RE/Gen CC-Series Etchants and hydrochloric acid until the ORP is (-520) - (-600) mV.

Note: Any oxidant used in the operation of cupric chloride etchants, including CC-series etchants, has the potential when handled improperly to generate lethal volumes of chlorine gas. If you have any questions regarding the recommended conversion procedure, call Seacole or your nearest Seacole technical representative.

Operating Parameters

Parameters	CC-15	CC-22	CC-28
Temperature	120 - 130°F	120 - 130°F	120 - 130°F
Etch Rate	1 oz./60 sec.	1 oz./55 sec.	1 oz./50 sec.
Spray Pressure	30 - 35 psi	30 - 35 psi	30 - 35 psi

CC-SERIES ETCHANTS was designed to be operated in a conveyORIZED spray system. Additions of CC-SERIES ETCHANTS, hydrochloric acid, 37% w/w, and water, are made utilizing the VIS-U-ETCH automated replenishment system. The VIS-U-ETCH replenishment system measures the copper concentration spectrophotometrically, and doses CC-SERIES ETCHANTS and hydrochloric acid into the etching bath automatically.

Technical Data Sheet

Control and Replenishment

It is necessary to periodically measure the copper concentration (as metal), hydrochloric acid normality, and specific gravity to assure the feed rates of CC-SERIES ETCHANTS, hydrochloric acid, and water are correct. Once the ORP controller settings have been established, it is recommended that frequency of testing be maintained to assure safe operation of the etchant.

Determination of Copper Concentration

Equipment Required	Reagents Required
Buret, 50 ml	Ammonium Hydroxide 50% V/V In Water
Erlenmeyer Flask, 250 ml	EDTA Standardized .10N
Pipet, 10 ml	Methanol ACS Reagent
Volumetric Flask, 100 ml	Pan Indicator

Procedure

1. Pipet 10 ml of sample into a 100 ml volumetric flask containing approximately 50 ml of deionized water. Fill to level with water and mix well.
2. Pipet 10 ml of dilute sample into a 250 ml Erlenmeyer flask containing 50 ml of deionized water.
3. Add approximately 10 ml of dilute ammonium hydroxide and 10 ml of methanol.
4. Add 4 - 5 drops of PAN indicator and titrate with standardized EDTA to a pale green endpoint. Record the number of mls required.

Calculation

$$\frac{A \times B \times C \times D}{E} = \text{g/L copper as metal in sample}$$

Where	A	=	volume of titrant required in ml
	B	=	M of the titrant
	C	=	dilution factor (10)
	D	=	M.W. of copper (63.54)
	E	=	sample volume in mls

Copper as metal should be maintained between 180 - 200 g/L for CC-15, between 210-225 for CC-22, and between 230 - 250 for CC-28. If the copper metal concentration is low, calibrate and adjust the VIS-U-Etch.

Technical Data Sheet

Determination of Hydrochloric Acid Normality

Equipment Required	Reagents Required
Buret, 50 ml	Methyl Orange Indicator
Erlenmeyer Flask, 250 ml	Sodium Hydroxide Standardized 1.00 N
Pipet, 5 ml	

Procedure

1. Pipet a 5 ml sample of etchant into a 250 ml Erlenmeyer flask containing 50 ml of deionized water.
2. Add 4 - 5 drops of methyl orange indicator and titrate with standardized sodium hydroxide to a pale yellow-green endpoint. Record the number of mls required.

Calculation

$$\frac{A \times B}{C} = N \text{ of hydrochloric acid in sample}$$

Where A = volume of titrant required in ml
 B = N of the titrant
 C = sample volume in mls

The acid normality can be operated within the range of 0.04 - 0.08 N. DO NOT ADD ACID MANUALLY!! Operating the etchant at higher acid concentrations will increase the speed of etching, increase the "etch factor" (degree of undercutting), and increase the attack on the resist. As the acid concentration is decreased, the "etch factor" will decrease, the rate of etching will decrease, and the level of attack on the resist will decrease. It is best to select an acid concentration suitable to individual needs, balancing speed and etch characteristics to maximize throughput. The VIS-U-ETCH will always maintain the minimum acid normality for the reaction to be maintained.

Safety and Handling

Read and understand this products MSDS before use.

Waste Treatment

Individual users should verify the nature of spent solutions to assure compliance with local, state, and federal regulations. Contact Seacole for specific details and/or further waste treatment recommendations.

Ordering Information

RE/GEN CC-22 is available in 55 gallon drums and 275 gallon totes.

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