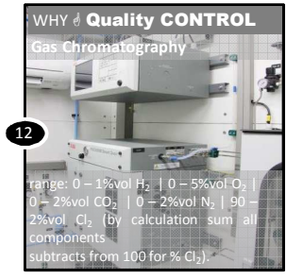
"SAFETY IS NOT EXPENSIVE - IT IS PRICELESS"

On-line Analyzer Systems for Safety and Control of Chlorine Production Plants

WHY ☝ **Quality CONTROL**

Gas Chromatography



12

range: 0 – 1%vol H_2 | 0 – 5%vol O_2 | 0 – 2%vol CO_2 | 0 – 2%vol N_2 | 90 – 2%vol Cl_2 (by calculation sum all components subtracts from 100 for % Cl_2).

17

range: 0.5 – 20 g/kg Na_2SO_4

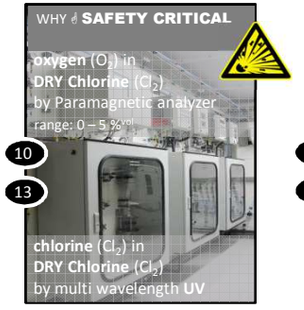
18

range: 1.000 mg/l meta bisulfite ($Na_2S_2O_5$)

WHY ☝ **SAFETY CRITICAL**

oxygen (O_2) in **DRY Chlorine** (Cl_2) by Paramagnetic analyzer

range: 0 – 5 %vol



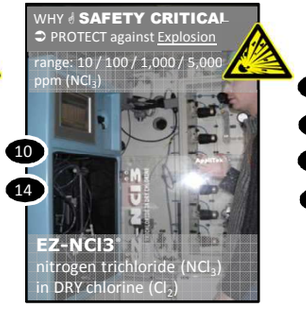
10 13

chlorine (Cl_2) in **DRY Chlorine** (Cl_2) by multi wavelength **UV**

WHY ☝ **SAFETY CRITICAL**

➲ PROTECT against Explosion

range: 10 / 100 / 1,000 / 5,000 ppm (NCl_3)



10 14

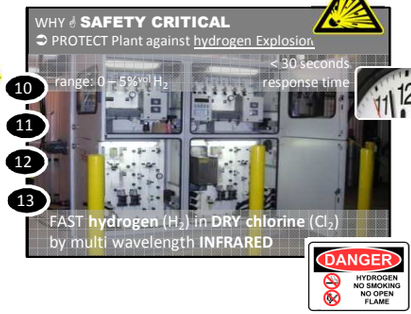
EZ-NCl3® nitrogen trichloride (NCl_3) in DRY chlorine (Cl_2)

WHY ☝ **SAFETY CRITICAL**

➲ PROTECT Plant against hydrogen Explosion

range: 0 – 5%vol H_2

< 30 seconds response time



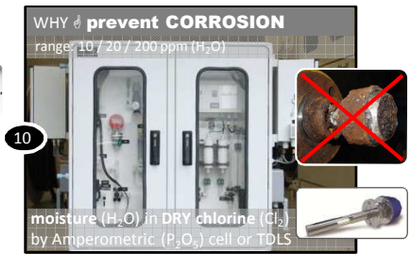
10 11 12 13

FAST **hydrogen** (H_2) in **DRY chlorine** (Cl_2) by multi wavelength **INFRARED**

DANGER HYDROGEN NO SMOKING NO OPEN FLAME

WHY ☝ **prevent CORROSION**

range: 10 / 20 / 200 ppm (H_2O)



10

moisture (H_2O) in DRY **chlorine** (Cl_2) by Amperometric (P_2O_5) cell or TDLS

WHY ☝ **PROCESS CONTROL** WHY ☝ **SAFETY**

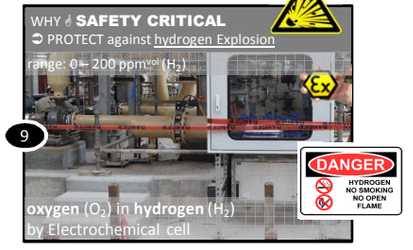
15 16

EZ-Bleach®
sodium hypochlorite (NaOCl)
sodium carbonate (Na_2CO_3)
sodium hydroxide (NaOH)
sodium chloride (NaCl)
in sodium hypochlorite (NaOCl)

WHY ☝ **SAFETY CRITICAL**

➲ PROTECT against hydrogen Explosion

range: 0 – 200 ppm_{vol} (H_2)



9

oxygen (O_2) in **hydrogen** (H_2) by Electrochemical cell

DANGER HYDROGEN NO SMOKING NO OPEN FLAME

WHY ☝ **brine QUALITY**

➲ Up-stream Control Brine Purification

LIMIT dosage of hydroxides (NaOH) & carbonates (Na_2CO_3)

1

UPA® titrimetric
2 points acid / base pH titration
range: 1 g/l NaOH | 1.5 g/l Na_2CO_3

WHY ☝ **caustic QUALITY**

range: 10 – 100 ppm (Cl⁻)

7

EZ-Chloride®
Chlorides (Cl^-) in caustic soda (NaOH)

WHY ☝ **brine QUALITY**

➲ Control Brine Filter Cleaning Flush-back

range: 0 – 50 FTU / NTU

2

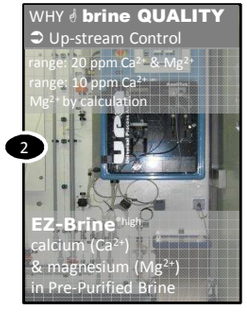
ULTRASONIC TURBIDITY in Pre-purified Brine

WHY ☝ **brine QUALITY**

➲ Up-stream Control

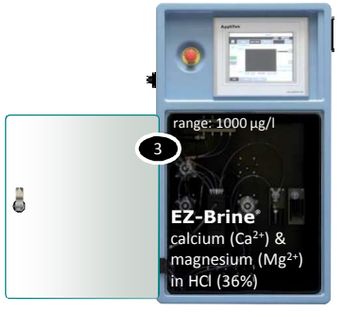
range: 20 ppm Ca^{2+} & Mg^{2+}

range: 10 ppm Ca^{2+} Mg^{2+} by calculation



2

EZ-Brine®high calcium (Ca^{2+}) & magnesium (Mg^{2+}) in Pre-Purified Brine



range: 1000 µg/l

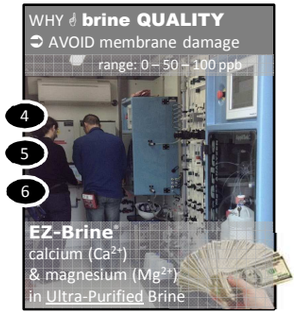
3

EZ-Brine® calcium (Ca^{2+}) & magnesium (Mg^{2+}) in HCl (36%)

WHY ☝ **brine QUALITY**

➲ AVOID membrane damage

range: 0 – 50 – 100 ppb



4 5 6

EZ-Brine® calcium (Ca^{2+}) & magnesium (Mg^{2+}) in Ultra-Purified Brine

WHY ☝ **SAFETY CRITICAL**

➲ AVOID formation of nitrogen trichloride (NCl_3)

range: 0 – 10 ppm

6

TONI® special (Total Ammonia)
Total Ammonia
[ammonia (NH_3) + monochloramine (NH_2Cl) + dichloramine ($NHCl_2$)]

WHY ☝ **SAFETY CRITICAL**

➲ EARLY WARNING hydrogen detection

➲ PROTECT your Chlorine Plant against hydrogen Explosion

8

FAST **hydrogen** (H_2) in **WET chlorine** (Cl_2) by multi wavelength **INFRARED**

< 30 seconds response time

DANGER HYDROGEN NO SMOKING NO OPEN FLAME

FAST **oxygen** (O_2) in **WET chlorine** (Cl_2) by Alternating Pressure Paramagnetic analyzer

AppliTek

Masters in Analytical Technology.

Non-producing member of The Chlorine Institute

Technical correspondent of eurochlor

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