TRUSTED CHLORINE MONITORING BY APPLIED ANALYTICS

OMA-300-CL2

Chlorine Analyzer

Optimized to monitor:

- ethylene dichloride (EDC) purity in the production of PVC
- NCl3 in the production of chlorine
- TiCl4 and vanadium in the production of titanium oxide
- VOCl3 in organic synthesis
- and more at www.a-a-inc.com

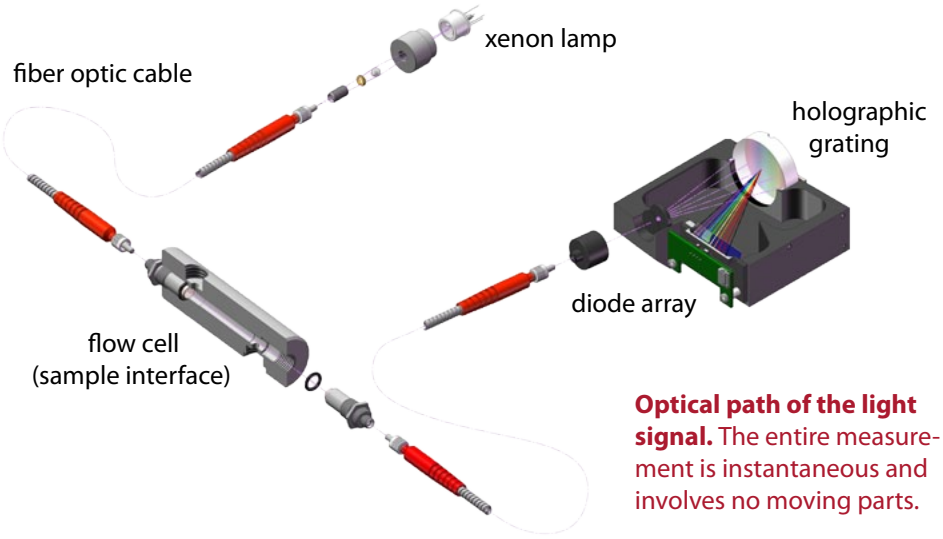
The OMA-300-CL2 showcases the capacity of full-spectrum diode array technology. This solid state instrument smoothly monitors chlorine and derivative compounds' concentrations from trace (ppm) levels up to saturated (high percent) levels, offering seamless dynamic range across a variety of chlorine-related applications.

With Multi-Component Analysis driven by diode array, a single OMA-300-CL2 monitors up to four chemicals in the process stream simultaneously.

FREQUENT EXTENSIONS: ClO_2 | NCl_3 | $TiCl_4$ | V^{2+} | $VOCl_3$

The nova-II Spectrophotometer

- UV-VIS diode array detection
  1,024 photodiodes
- broad spectral response
  190-800nm range
- maximal light throughput
  high-grade optics, strong Xe source
- exceptional in low UV range
  minimal stray light
- CMOS analog circuitry
  low noise, low power consumption
- streamlined, solid state design
  no mirrors or filters



Optical path of the light signal. The entire measurement is instantaneous and involves no moving parts.

MONITORING **FERRIC CHLORIDE** ($FeCl_3$) AND **CHLORINE** (Cl_2) IN THE MAKING OF PVC

Ethylene dichloride (EDC) is the first intermediate in the manufacturing of the versatile plastic PVC from raw materials. Heated to 500 °C in a cracking furnace, EDC splits into VCM (the precursor to PVC) and recyclable HCl. The EDC entering the furnace sometimes contains ferric chloride, the catalyst used to chlorinate ethylene in creating EDC; this contamination is far from trivial as trace FeCl3 is known to foul the furnace. Furthermore, PVC made from EDC with impurities (i.e. low-level FeCl3 and chlorine) does not meet the specifications of high-quality PVC.

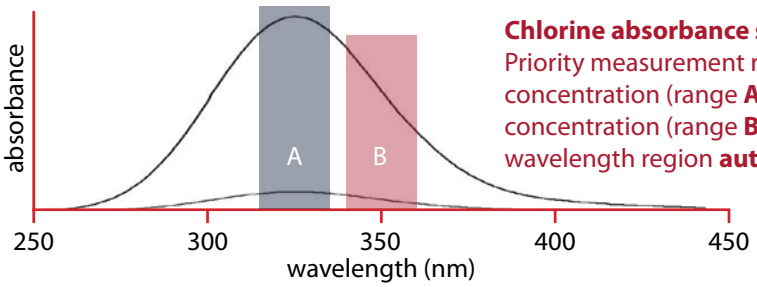
MONITORING **TITANIUM TETRACHLORIDE** ($TiCl_4$) AND **VANADIUM** IN THE PRODUCTION OF TITANIUM OXIDE (TiO_2) PIGMENT

Known in painting as the "whitest white," TiO2 is a widely used pigment. In the chloride production method, titanium ore is converted to TiCl4, from which metallic chloride impurities are discarded; oxidation of purified TiCl4 yeilds bright, finish-ready TiO2. Two yeild-critical points in this process require online analysis: 1) ensuring that the TiCl4 is vanadium-free to protect pigment quality, and 2) monitoring effluent from the oxidation vessel for unreacted TiCl4 to very the efficiency of conversion to desired TiO2.

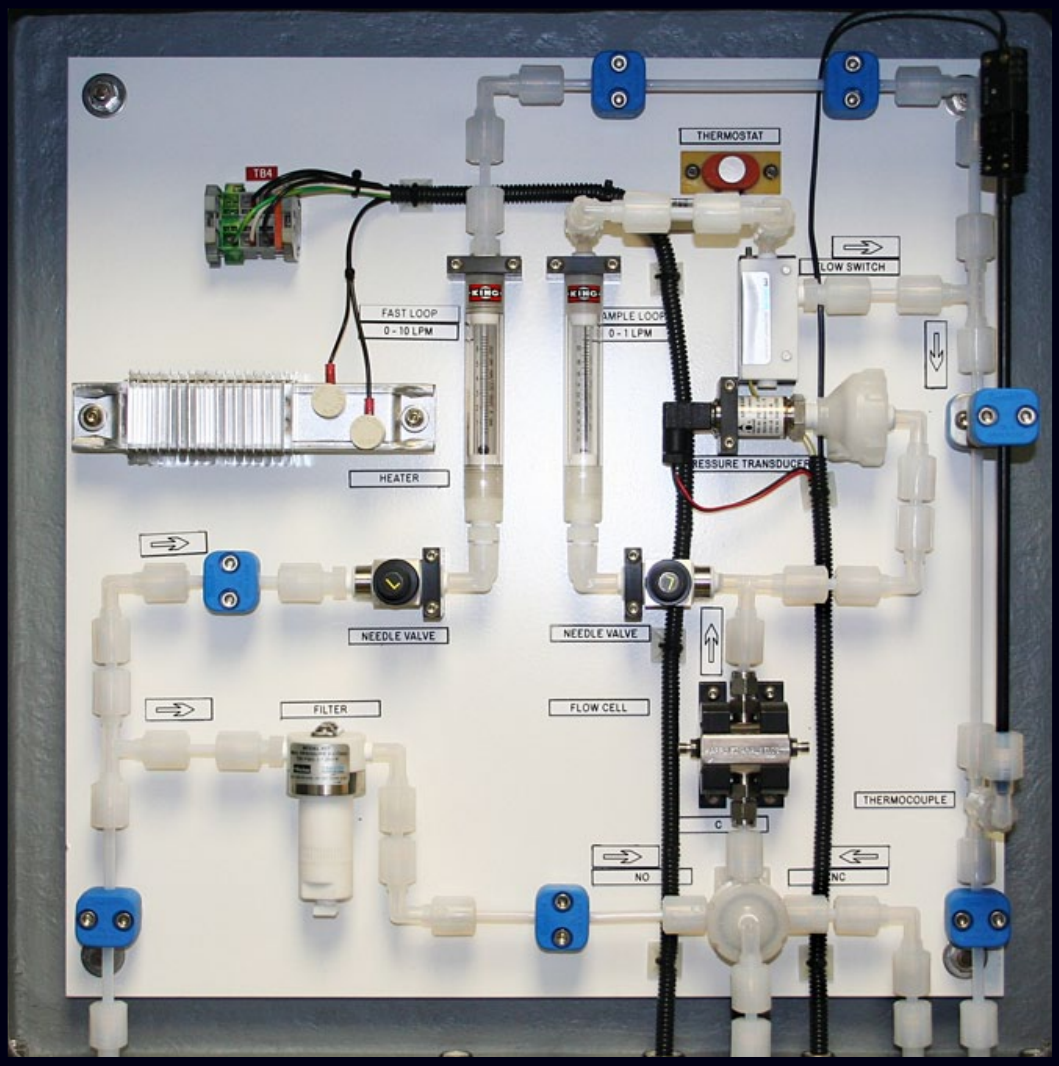
SOLUTION: THE **OMA-300 CHLORINE COMPOUND ANALYZER**

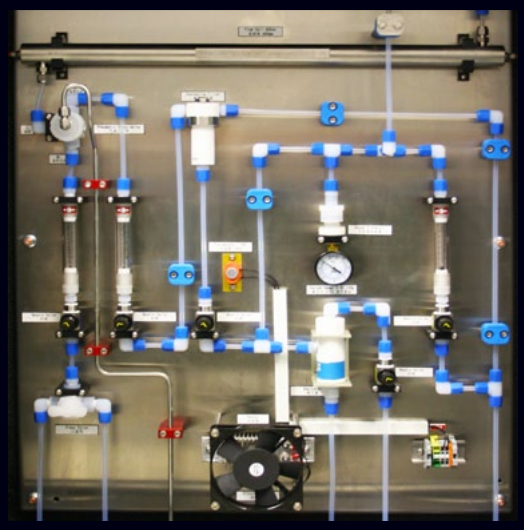
While traditional photometric analyzers struggle with cross-interference between different chlorine compounds, the OMA-300 has **Multi-Component Analysis** powered by diode array technology. To view an animated explanation of how AAI's proprietary algorithm isolates the precise absorbance of each chlorine compound from the stream absorbance spectrum, please visit: http://www.a-a-inc.com/multi-component/

The ability to monitor a species such as chlorine accurately both at trace ppm levels and at high per cent levels is known as **dynamic range**. This versatility revolves around light signal optimization according to current concentration. Chlorine's high-absorbance 315-330nm range is useful when monitoring very low concentrations, but when the concentration rises significantly, absorbance is too strong in this range and no light is transmitted; in a high %wt chlorine scenario, the moderate-absorbance 390-410nm range is ideal. The OMA-300 shifts wavelength range seamlessly in step with live chlorine concentration, exploiting the broad spectral response of the nova-II for unrivaled dynamic range.



Chlorine absorbance spectrum. Priority measurement ranges for low Cl2 concentration (range **A**) and high Cl2 concentration (range **B**). The nova-II shifts wavelength region **automatically**.



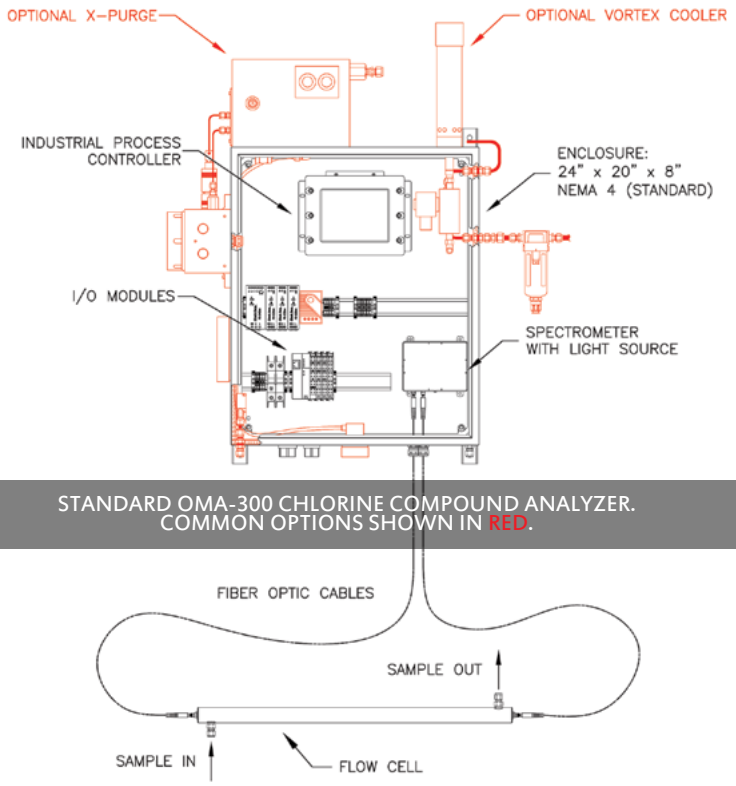


		2
1		3
4	5	6

SAMPLE CONDITIONING

1) 0-50 % **Cl_2** and 0-30% **NCl_3;** Teflon fittings prevent particle generation.
2) 0-10ppm **vanadium** in liquid $TiCl_4$ stream; used in the production of white TiO_2 pigment.
3) 0-100ppmv **Cl_2** in vent stream; used downstream of a wet scrubber system for environmental compliance.
4) 0-10ppm **VCl_5** in liquid $TiCl_4$ stream; used to measure $TiCl_4$ purity in a distillation operation.
5) 0-2,000 ppm **NCl_3** in gas; used for safety.
6) 0-10ppm **$VOCl_3$** in liquid.

SPECIFICATIONS



STANDARD OMA-300 CHLORINE COMPOUND ANALYZER.
COMMON OPTIONS SHOWN IN RED.

Measurement Technology	UV-VIS diode array spectrometer (nova-II)
Light Source	Pulsed xenon lamp (~5 year lifespan); deuterium and tungsten sources available
Sample Introduction	Flow-through cell; standard or custom-design sampling system (optional)
Accuracy (by Range)	**Cl2** 0-100 ppm: ±5 ppm 0-10,000 ppm: ±2% full scale or 5 ppm* 0-100%: ±2% full scale **TiCl4** 0-2,000 ppm: ±15 ppm 0-10,000 ppm: ±1% full scale **vanadium** 0-5 ppm: ±0.3 ppm **FeCl3** 0-300 ppm: ±1% full scale 0-10,000 ppm: ±1% full scale **NCl3** 0-100 ppm: ±5 ppm 0-10,000 ppm: ±1% full scale 0-5%: ±1% full scale (*whichever larger)
Calibration	For most applications, factory calibrated with certified calibration gases/liquids
Verification	Easy verification/validation with gas/liquid samples or neutral density filters
Ambient Temperature	Standard: 0 to 55 °C (32 to 131 °F); Optional: -20 to 55 °C (-4 to 131 °F)
Sample Temperature	-20 to 150 °C (-4 to 302 °F)
Sample Pressure	Immersion probe: 100 bar (1470psig) Flow cell: 206 bar (3000 psi)
Environment	Indoor/outdoor (no shelter required)
Size	Analyzer: 24" H x 20" W x 8" D (610mm H x 508mm W x 203mm D) Optional sampling system: 24" H x 30" W x 8" D (610mm H x 760mm W x 200mm D)
Weight	32 lbs. (15 kg)
Wetted Materials	Analyzer: Teflon, K7 glass, Kalrez, Hastelloy C-276 Optional sampling system: Teflon, quartz, Kalrez, Hastelloy C-276
Outputs	One galvanically isolated 4-20mA output per component; modbus TCP/IP (optional); RS232 (optional); Fieldbus, Profibus, and HART (all optional); two digital outputs for fault and sampling system control (user programmable)
Electrical Requirements	85 to 264 VAC 47 to 63 Hz
Power Consumption	45 watts
Area Classification	General Purpose (standard) / Class I, Div. 2 (optional) Class I, Div. 1 (optional) / ATEX Exp II 2(2) GD (optional)

HEADQUARTERS

Applied Analytics, Inc.
Concord, MA, USA
Tel: (978) 287-4222
Fax: (978) 287-5222
sales@a-a-inc.com

NORTH AMERICA

Applied Analytics North America, Ltd.
Houston, TX ,USA
sales@appliedanalytics.us

EUROPE

Applied Analytics Europe, SpA
Milan, Italy
sales@appliedanalytics.eu

MIDDLE EAST

Applied Analytics Middle East (FZE)
Sharjah, United Arab Emirates
sales@appliedanalytics.ae

ASIA PACIFIC

Applied Analytics Asia Pte. Ltd.
Singapore
sales@appliedanalytics.com.sg

INDIA

Applied Analytics (India) Pte. Ltd.
Mumbai, India
sales@appliedanalytics.in

MADE IN USA

www.a-a-inc.com

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