



MARTEK® ICOD

ION CHROMATOGRAPH OXIDATION DEVICE

MARTEK INSTRUMENTS INC. MANUFACTURERS OF WATER QUALITY INSTRUMENTATION



***... for accurate, low level
detection of organic contaminants
in ultrapure water processes***

The Martek Ion Chromatograph Oxidation Device (**ICOD**) is an ancillary tool designed to provide a reliable and accurate method of detecting low levels (ppb) of organic contaminants.

Many steam plants, both nuclear and fossil-fueled, require make-up water at regular intervals. The source of this make-up water may come from outside the plant (i.e. mobile water units), from the plant's own water treatment system, or from the reprocessing of collected leakage and process water. The importance of maintaining sufficient levels of water quality is of primary concern for the personnel responsible for any water chemistry program.

Organic compounds are one source of contaminants that can be introduced into a process stream in

several ways. Some, notably nitrate-bearing compounds such as urea, can be introduced via the water treatment plant. These organic nitrates typically result from sewage treatment plants discharging into the make-up source upstream of the plant's intake. Another source is seasonal runoff from farming in the watershed of the make-up source or environmentally-safe ice melts.

While such processes as reverse osmosis, demineralization, and ozonation remove the vast majority of organic, nitrate-bearing compounds, some amounts can remain in the stream.

One other potential source of organic contaminants is the demineralization system. Expanded cation resin will tend to leach sulfonic acid in the process stream and will appear in the reactors of nuclear plants as sulfate.

To detect these organics at very low part-per-billion concentrations, the ICOD is employed to break down these compounds into a detectable form prior to analysis by ion chromatography.

In order to sufficiently oxidize the organic compounds, a quartz coil is used that allows a large surface-to-volume ratio while minimizing the possibility of sample contamination. An external pressure chamber is pressurized at 3 psig to force the sample through the ICOD. A variable timer allows the operator to select the amount of UV exposure for the sample. Once the sample has been sufficiently exposed to the UV light, it is passed directly to the IC for analysis.

The Martek ICOD's ability to provide low-level detection of organic contaminants make it an important accessory for existing IC analysis when monitoring high purity make-up processes in nuclear and high-performance fossil fuel power plants.

Tests conducted with the Martek ICOD have indicated an efficiency of 15% for urea nitrate and 90% for p-toluene sulfonic acid (p-TSA). Urea nitrate was used because of its presence in most make-up waters while p-TSA was selected due to its similarities to the sulfonic group commonly introduced by degraded cation-form resin.

The efficiency of the ICOD is based on three factors: Flow rate of the sample, exposure to the UV source, and the structure of the molecule to be oxidized. Below are examples of the efficiencies obtained on urea nitrate and p-TSA.

Analysis of Urea Nitrate Standards

Concentration (ppb)	Calculated Yield (ppb)	Recovery (ppb)	Recovery (%)
2	4.13	0.76	18
20	41.28	6.28	15
40	82.6	12.24	15

These results are the average of five analysis at each concentration and were corrected for a nitrate background of 3.0 ppb from laboratory reagent water. All analysis showed small amounts of chloride and sulfate contamination when subjected to UV light. These ions were not present in non-UV'd samples and are likely contaminants in the urea nitrate.

Analysis of p-TSA Standards

Concentration (ppb)	Calculated Yield (ppb)	Recovery (ppb)	Recovery (%)
2	1.11	1.02	92
20	11.15	10.33	92
40	22.30	22.64	100

These results are the average of five analysis at each concentration and are corrected for a sulfate background of 0.5 ppb from laboratory reagent water. All analysis showed nitrate and chloride contamination when subjected to UV light proportional to the p-TSA concentration. Nitrates and chlorides were not present in the non-UV'd samples.

MARTEK ICOD SPECIFICATIONS

Power	120 VAC, 50/60 Hz
Weight	Analyzer - 10 lbs (22 kg), Pressure Chamber 2 lbs (0.9 kg)
Dimensions	Analyzer - 11.81" H x 9.84" W x 6.69" D
Environmental	NEMA 12 (IP 65), Operating temperature 10° C to 80° C

ORDERING INFORMATION

P/N
180-90 Martek ICOD with Pressure Chamber

NOTE:

All prices FOB Factory. Specifications and prices subject to change without prior notice. Warranty subject to certain conditions. For complete warranty information, contact the factory.



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