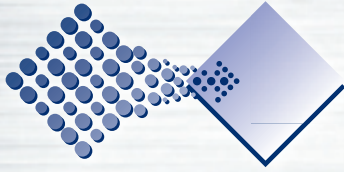


On-Line Detection of Rouge in Water Distribution Systems



The complexity of the rouging process requires that at least two variables be examined: 1) The presence of iron ions (Fe^{2+} or Fe^{3+}) and 2) the detection of iron containing particulates (hydroxides or oxides). In water systems the dissolved oxygen, PH, and temperature are sufficient to convert a majority of the Fe^{2+} into Fe^{3+} and the iron hydroxides into ferric oxide. Therefore, the two most important species to monitor in the process flow are Fe^{3+} and ferric oxide. Monitoring of these two species will help water distribution managers identify when maintenance of the water system is required.

Defining the Problem

Rouging is defined as a thin film, with colors ranging from green through yellow to reddish-brown, of iron oxide or hydroxide on an iron-containing surface. In water systems rouge typically appears on stainless steel tubing, vessels, tanks, stills, pump housings, etc. Rouge as generally defined only refers to ferric oxide (Fe_2O_3), but in reality may contain chromium, nickel, and non-oxide iron compounds, which may result in the broad range of colors observed in water distribution systems. In general, rouge is more prevalent on mechanically polished stainless steel, but has also been observed on electropolished and passivated stainless steel.

Photometric Transmitters

Custom Sensors & Technology manufactures a low cost UV or VIS Photometric Transmitter that optically measures the amount of (Fe^{2+} , Fe^{3+} , or iron oxide) in your process water stream.

Fe^{2+} or Fe^{3+}
Photo-X
UV, Suited
for C1D1
areas

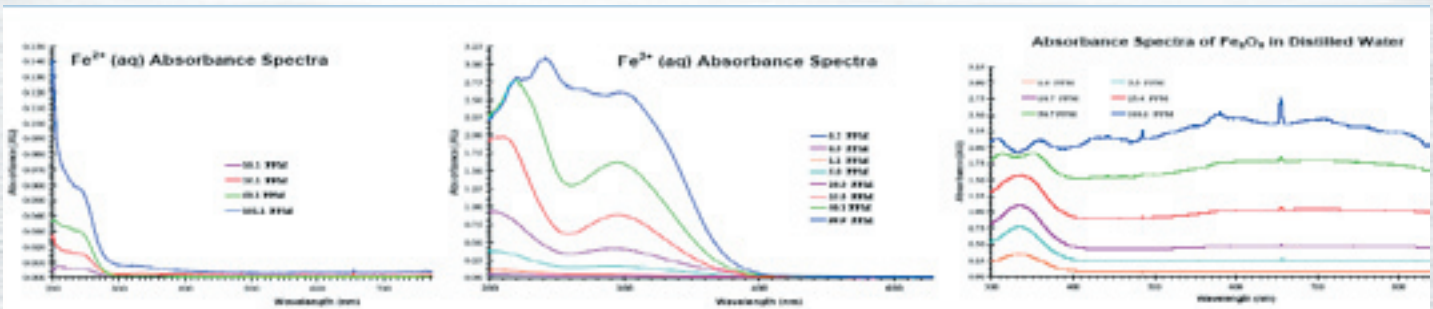


Iron Oxide,
Photo-X
VIS, Suited
for GP
areas.



The CST Solution to Monitoring and Controlling of "Red Water"

Continuously monitoring for the precursors (Fe^{2+} , Fe^{3+}) to ferric oxide formation (Fe_2O_3) can offer customers a means of detecting the onset of "red water" water systems. The spectra below show the relationship between different iron species and wavelength.



Monitoring in the UV and Visible regions of the spectrum will provide customers with the ability to manage their maintenance activities with a more effective strategy. Additionally, proper placement of the sensor may assist the customer with pinpointing the origin of the problem (weld, impeller blades, piping, etc.).

Benefits of the CST Rouge Monitor System

- Continuously monitors the Fe^{2+} , Fe^{3+} or Fe_2O_3
- 4-20mA range output
- Transmitter electronics separated from Process via fiber optic cables

Custom Sensors & Technology is a manufacturer of process photometric and electrochemical based process transmitters

Product Specifications

Transmitter

Measured parameter	Iron Oxide, Iron +2 ion, or Iron +3 ion
Resolution	0.02AU
Temperature Range	-10°C to +55°C
Response time	< 30 sec
Maximum Zero shift	0.005AU (over +20 to +40°C)
Long term output drift	<2% signal loss/year
Repeatability	1% of range
Light source	LED (guaranteed 10 year minimum life), or Xenon flash lamp (two year life)

User Display & control

Type of display	LED display
Display numerical format	3-1/2 digits in user defined engineering units

Electrical

Power requirement	24V DC (9-32VDC)
Power consumption	350mA @ 24VDC
Analog outputs	4-20mA isolated
Analog loop resistance	500 Ohms, maximum @ 24V
Alarms	Optional
Certification	Available upon request

Mechanical

Transmitter weight	1lb.
Enclosure construction	Extruded Aluminum, (Nema 4X, purge kits optional)
Enclosure Size	8" x 3-7/8" x 1-1/2" " (HWD")

Flow Cells*

Materials	316SS, or Hastelloy C
Max Temperature rating	315.5°C (600°F)
Max Pressure rating	5,000 psig

*Consult factory for specifications on pathlength and any sample handling systems required.

Portable and fixed installed units are available to help determine the best time for line passivation.

Custom Sensors & Technology is a full service provider. We also supply photometric transmitters, fiber optic probes & flow cells, O₂ transmitters, sample handling systems, and services including: application engineering, commissioning & start-ups, product validation, factory acceptance testing, process stream GAP Analysis, and in-house repair.