

ONLINE MONITORING OF ETHYLENE GLYCOL PURITY

Ethylene glycol (EG), also referred to as monoethylene glycol (MEG), is a common chemical that is manufactured for use in the following products:

- Anti-freeze and de-icing fluids
- Polyesters fibers and films
- Paints and printing inks
- Heat transfer fluids

MEASUREMENT REQUIREMENT

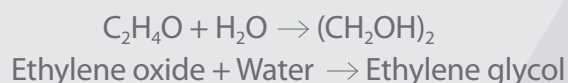
The purity of ethylene glycol must be continuously monitored during its manufacture to assure it meets final product specifications.

The most important quality control parameter in the ethylene glycol manufacturing process is the measurement of percent transmittance (%T) at multiple wavelengths

within the ultraviolet UV spectral region. Unfortunately, this measurement typically requires that plant technicians enter the production environment to grab product samples for later analysis in the quality control lab. This can introduce a personnel safety risk, and delay response to any process upsets.

PROCESS OVERVIEW

Ethylene glycol (CH₂OH)₂ is commercially prepared by the hydration of ethylene oxide (C₂H₄O).



ASTM E 2193 is one of the quality control methods used for ethylene glycol processes. This method consists of measuring the %T at four wavelengths: 220nm, 250nm, 275nm, and 350nm, or any other wavelengths required by the relevant product specification.

After production, the UV spectra for two ethylene glycol samples are shown below. Scan A represents an ethylene glycol product that met its product specification. Scan B is an example of an off-spec ethylene glycol product that failed to meet the product requirements for minimum transmittance at 220nm, 250nm, and 275nm.

The AMETEK IPS-4 integrated photometric spectrometer can be installed and will provide continuous and automated measurements of transmittance in the production of liquid ethylene glycol. The IPS-4 can measure four wavelengths simultaneously, eliminating the need for multiple analyzers or grabbing samples for measurement at a quality control lab.

With auto-zero and auto-calibration/validation capabilities, the analytical performance of the IPS-4 can be set or confirmed from a remote location. This reduces safety risks in the production environment, while identifying off-specification product immediately.

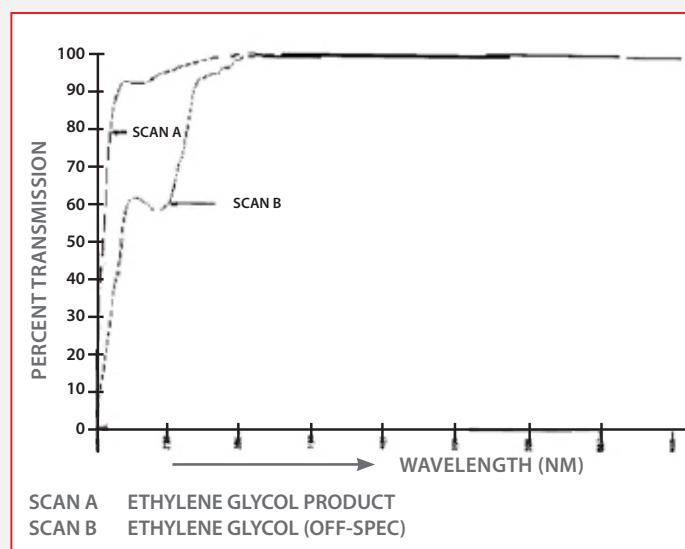


Figure 1. UV spectra for two ethylene glycol samples

REDUCED MAINTENANCE REQUIREMENTS

No moving parts in the optical bench

- Xenon flash lamp source provides long service life – typically greater than five years
- Auto-zero and auto-calibration capability
- Modular integrated photometer system for UV, VIS and NIR applications
- NEMA 4X indoor/outdoor housing



Figure 2. The IPS-4 integrated photometric spectrometer

ANALYTICAL PERFORMANCE

- Fast optical response of diode array
- Full-spectrum analysis allows use of mathematical algorithms for difficult applications
- Optional heated sample cell compartment available for operation up to 150°C (302°F)

EASE OF USE

- Easy-to-use, multi-language display
- Analog I/Os, Digital I/Os, Serial and Ethernet connections provide a variety of communication interface options
- Modbus RTU communications protocol

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