

Trilogy

Methods & Calibration

TECHNIQUE USED

The ISO 7027 Turbidity Technique is used to determine the concentration of suspended particles in a sample of water by measuring the incident light scattered at right angles. The scattered light is captured by a photodiode, which produces an electronic signal that is converted to a turbidity value as illustrated in Figure 1. Modern turbidimeters use nephelometric measuring principals instead of transmittance because forward scattering of light is dependent on the shape and size of the particle. Thus measuring transmittance can be difficult at low or high turbidities due to the variability of the light transmitted through the sample. Nephelometry is the most commonly used quantitative method for determining turbidity with greatest accuracy. Many researchers use nephelometers because they are unresponsive to small changes in design.

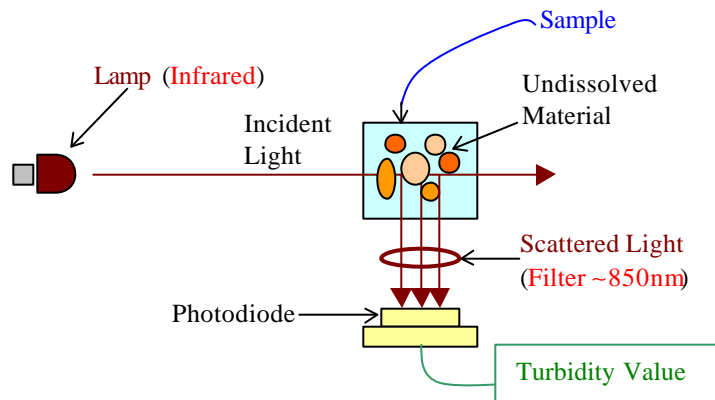


Figure 1: Basic turbidimeter design using nephelometric measuring technique

ISO 7027 UTILIZING TRILOGY TURBIDITY MODULE

The common light sources used in turbidimeters are incandescent lamps, termed “polychromatic” because of the broad spectrum they emit. The many wavelengths of light coming from this source can cause colorimetric interference in turbidity readings. Also, incandescent lamp output tends to fade over time as the lamp burns out making it necessary to calibrate and check stability of the instrument more frequently. The Trilogy Turbidity Module uses light emitting diode (LED) or “monochromatic” light source, which emits a narrow band of light (**Infrared**) minimizing wavelength interference. Light emitting diodes have a lifetime of 10 years, 20 times greater than incandescent light and require no warm up time. Although LEDs are used to emit a narrow spectrum of light through the sample it is quite difficult to produce a light source that will emit a single wavelength of light further increasing the accuracy of the measurement. The Trilogy Turbidity Module uses an ~850 nm narrow band pass filter to block the unwanted light emitted by the LED.

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CUVETTES

Methacrylate 10x10 mm (square) disposable cuvettes, PN 7000-959, are recommended for use with the Trilogy turbidity module. These cuvettes allow the passage of a broad range of wavelengths maximizing the incident light entering the sample, which allows for more accurate turbidity detection.

CALIBRATION

Nephelometric Turbidity Unit (NTU) is the unit of measure used when calibrating the Trilogy fluorometer for turbidity. There are a variety of solutions that can be used as calibration standards. [Amco Clear Analytical Turbidity Standards](#) are recommended because the standard is a non-toxic safe solution consisting mainly of deionized water which comes prepared in a broad range of concentrations and has a shelf life guaranteed for one year.

1. With the Trilogy turned off, raise the lid and gently snap in the Turbidity module
2. Turn the Trilogy on by locating the on switch on the back panel
3. When prompted, Press "**Turbidity**" module, then press "**OK**" to confirm the selection after making sure the correct module is being used
4. Once the home screen is loaded, press "**Calibrate**" to begin calibration
5. Select "**Run New Calibration**", the default unit of measure is displayed as Nephelometric Turbidity Units (NTU)
6. Insert the calibration blank and press "**OK**"
7. Enter the first calibration standard in increasing concentration and press "**OK**"
8. Follow the screen prompt indicating that the standard should be inserted and press "**OK**"
9. After calibration is complete, either select "**Proceed with Current Calibrations**" or select "**Enter More Standards**"
10. If making a multipoint calibration repeat steps 7 through 9 for calibrant
11. Save the calibration for future use (optional)
12. Subsequent measurements in Direct Concentration mode will reflect the actual concentration of the suspended particles based on the calibration curve

REFERENCES

International Organization for Standards (ISO). 1990. International Standard ISO 7027 – Water Quality – Determination of Turbidity. ISO. Second edition 1990-04-15

EPA Guidance Manual. April 1999. Turbidity Provisions. Chapter 3, 11 and Appendix C.