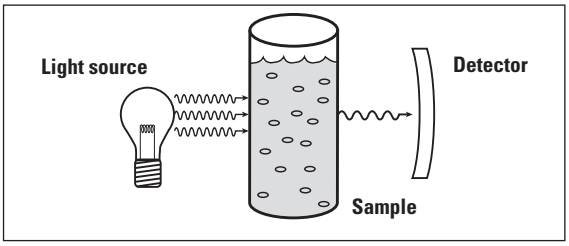
Optical Measurement

Light

When light passes through a liquid, the amount of particles and color in solution will affect the light. Optical techniques measure solution characteristics by using a defined light source, passing the light through a sample, and then measuring the light that passes through the sample. Turbidimetric and colorimetric methods both involve measuring the resulting light intensity. They differ in that the light is attenuated by scattering in turbidimetry and by absorption in colorimetry.

Both determinations may use similar instrumentation. By employing different wavelengths of light and different optical configurations, we can optimize the system for determining the transmitted light of interest for a given analytical method.



Turbidimetry

The cloudiness in a liquid caused by the presence of finely divided, suspended material is called "turbidity." Turbidity meters provide a means of quantifying this "cloudiness" by determining the reduction of light passing through a turbid solution and then comparing the results against a standard. In some applications the clarity of solution is critical. In other applications the appearance of particles indicates bacterial growth. In either case the turbidimeter provides process numerical data on the sample solution.

Colorimetry

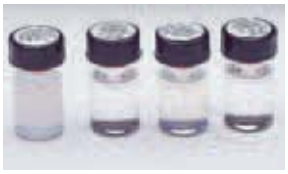
The colorimetric method of chemical analysis involves the measurement of light absorption by colored solutions. While the differences in color development are visible to the human eye, visual determination is subject to user interpretation. Colorimeters eliminate the differences encountered with color comparitors to produce an exact numerical value—with greater resolution that can be achieved through comparitors. Colorimeters use the well-understood principals of wet chemistry to provide precise, repeatable analysis methods. For example, the standard DPD method for determining free and total chlorine is well accepted and approved by the US EPA.

Reagents and Accessories

Reliable reagents and standards ensure accurate measurement for turbidimeters and colorimeters

Turbidity Calibration Set

For use with the T-100 turbidity meter sold on page 61. Stable standards ensure accurate turbidity measurements.



Catalog number	Description	Included
WD-35635-50	Calibration set	One each of primary calibration standard cuvettes filled with 0.02, 20.0, 100, and 800 NTU standards

Secondary Chlorine Standards

Verify performance of your C201, C301 or C401 colorimeters.

Catalog number	Description	Included
WD-35645-70	Secondary standards	Set of four vials

Colorimeter Reagents

The pH reagent features a dropper bottle making it easy to repetitively provide the correct amount of reagent. The convenient foil packs are ideal for use in the field or in the lab. DPD reagents follow US EPA method 330.5 for wastewater, and Standard Method 4500-Cl G for drinking water.

Catalog number	Description	Included
WD-35645-60	pH reagent	Dropper bottle, for 50 tests
WD-35645-62	Cyanuric acid reagent	100 foil packs
WD-35645-64	Free-chlorine reagent DPD	100 foil packs
WD-35645-66	Total-chlorine reagent DPD	100 foil packs
WD-35645-68	Chlorine dioxide reagent	100 foil packs

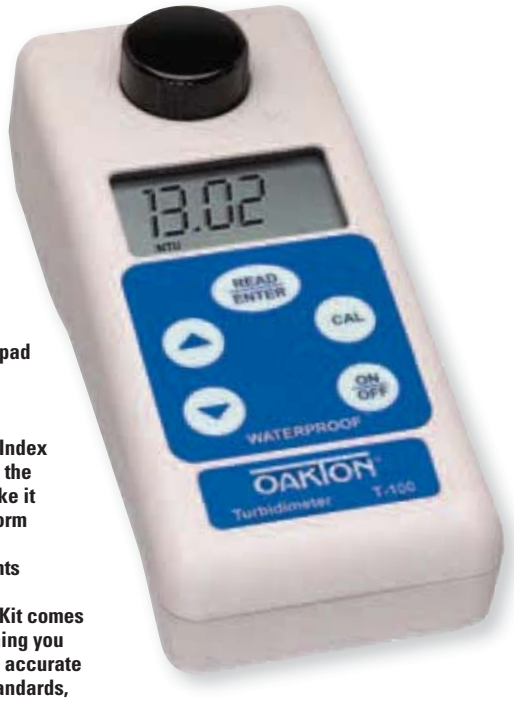
Cuvettes

For use with the turbidity meter on page 61 and all colorimeters on pages 62–63. High-quality borosilicate glass ensures good light transmittance. Indexing mark on each cuvette makes it easy to get repeatable results.

Catalog number	Description	Included
WD-35653-55	Cuvettes	Pack of three

T-100 Turbidity Meter

Completely waterproof—even the sample chamber



Left top: Keypad with tactile feedback

Left middle: Index markings on the cuvettes make it easy to perform repeatable measurements

Left bottom: Kit comes with everything you need to take accurate readings; standards, sample vials, and a rugged carrying case

Right top: T-100 turbidity meter features a large, 4-digit display

Right bottom: Full-segment LCD is easy to read

Waterproof and dustproof housing

- IP67-rated waterproof housing allows operation in wet conditions ensuring durability, easy cleaning, and maintenance—it even floats!

Auto-ranging from 0 to 1000 NTU

- Meter determines the sample's turbidity level and automatically adjusts to the appropriate measurement range—eliminating any guesswork

Simple, display-prompted push-button calibration

- Pressing the "CAL" button initiates the quick and simple calibration procedure. The instrument automatically prompts the user for the next calibration standard.

Large, easy-to read display

- Large, custom LCD shows readings with units of measure and user-friendly message codes that guide meter operation

Advanced power supply management

- Measures over 1200 samples with a single set of batteries, delivering quick stable results in less than six seconds. Also features auto-off function.

Sturdy carrying case with accessories

- Compact case contains all items necessary for turbidity measurements and protects the meter when not in use. Items include the T-100 meter, four primary calibration standards, three borosilicate sample cuvettes with light shield caps, collection bottle, lint-free cloth, silicone oil, and batteries.

Applications

Drinking Water: Use to test for bacteria and other growth.
Food & Beverage Industry: Test water clarity and check for unwanted contamination.
Environmental/Aquaculture: Test waters in streams, lakes, and ponds on site.
General Industrial: Great for checking water in petrochemical, electroplating, and other industrial settings.

ISO 9001:2000 CERTIFIED SUPPLIER CE 2 year warranty

Specifications

Mode	T-100 Turbidity meter
Range	0.1 to 19.99 NTU, 20.0 to 99.9 NTU, 100 to 1000 NTU
Resolution	0.01 NTU, 0.1 NTU, 1 NTU
Measurement method	ISO 7027 (DIN EN 27027) compliant nephelometric method (90°)
Accuracy	±2% of measurement from 0 to 500 NTU, ±3% of measurement from 501 to 1000 NTU
Repeatability	±0.01 NTU or ±1% of measurement, whichever is greater
Response time	<6 seconds for full-step change
Calibration standards	0.02 NTU, 20.0 NTU, 100 NTU, 800 NTU

Standardization: EPA-approved polymer-based primary standards
Light source: infrared-emitting diode (850 nm wavelength)
Light source life: >1,000,000 measurements
Detector: Silicon photovoltaic
Stray light: <0.02 NTU
Display: 4-digit, 14-segment customized LCD
Sample vials: borosilicate glass with screw caps, fill line, and indexing mark. 2"H x 1"dia (51 x 25 mm)
Sample volume: 10 mL (0.33 oz) minimum

Operating temperature range: 0 to 50°C (32 to 122°F)
Operating humidity: 0 to 90% RH, noncondensing at 86°F (30°C) range
Power: four AAA alkaline batteries (included), >1200 measurements
Enclosure: ABS plastic/IP67 rated
Dimensions
Meter: 2.7"W x 6.1"L x 1.8"H (6.8 x 15.5 x 4.6 cm)
Meter with case: 6.3"W x 13.8"L x 4.7"H (16 x 35 x 12 cm)
Weight
Meter: 7 oz (200 g); Meter with case: 2.75 lb (1.25 kg)

Ordering Information

Catalog number	Description	Includes
WD-35635-00	T-100 turbidity meter kit	Meter, four primary calibration standards (0.02, 20.0,100, and 800 NTU), three empty cuvettes with light shield caps, collection bottle, lint-free cloth, silicone oil, batteries, and hard carrying case

WD-35635-50 Replacement calibration set, includes one each of primary calibration standard cuvettes filled with 0.02, 20.0, 100, and 800 NTU standards

WD-35653-55 Replacement cuvettes, borosilicate glass. Pack of three

C100 Series Single-Parameter Colorimeters

Choose from five models

Simple to use
▼ One-time blanking for multiple measurements

Waterproof and dustproof IP67 housing
▼ Even the sample chamber is waterproof

Compact size
▼ Take your Oakton colorimeter anywhere!

Light shield and detachable parts not required
▼ Vial cap prevents stray light from affecting readings

Large, easy-to-read display
▼ Large, custom LCD shows readings with units of measure and user-friendly message codes that guide meter operation

Advanced power-supply management
▼ Measures over 1200 samples with a single set of batteries, delivering quick stable results in less than six seconds. Also features auto-off function.

Sturdy carrying case with accessories
▼ Compact carrying case includes all items necessary for colorimeter measurements and protects the meter when not in use

C101 colorimeter features:
▼ Dropper bottle pH reagent—use just a few drops per test

C102, C103, C104, and C105 colorimeters feature:
▼ Convenient foil pack reagents—use one foil pack per test

Right: C101 pH colorimeter

Above: Colorimeter shown with kit, which includes reagents that come premixed and ready to use.

35645-10

ISO 9001:2000 CERTIFIED SUPPLIER CE 2 year warranty meter only

Specifications

Mode	C101	C102	C103	C104	C105
Parameter	pH	Cyanuric acid	Chlorine dioxide	Bromine	Ozone
Range	5.9 to 8.2 pH	5 to 90 ppm	0 to 11.4 ppm	0 to 13.5 ppm	0 to 4.1 ppm
Resolution	0.1 pH	1 ppm	0.01/0.1 ppm	0.02/0.2 ppm	0.01/0.1 ppm
Accuracy	±0.1 pH	±1 ppm	±0.02/0.2 ppm	±0.03/0.3 ppm	±0.02/0.2 ppm

Light source: light emitting diode (LED)
Wavelength: 525 nm
Detector: silicon photodiode
Absorbance range: 0 to 2.5 Abs
Photometric precision: ±0.0015 Abs
Calibration points: user-selectable, one point per colorimetric test
Sample volume required: 10 mL (0.33 oz)
Display: 4-digit, 14-segment, customized LCD with annunciators
Operating temperature range: 0 to 50°C (32 to 122°F)
Operating humidity range: 0 to 90% RH, noncondensing at 30°C (86°F)
Power supply: four AAA alkaline batteries (included)
Battery life: >3000 tests
Electromagnetic compliance: (EMC) EN 61326
Dimensions
Meter: 6.1"L x 2.7"W x 1.8"H (15.5 x 6.8 x 4.6 cm)
Meter with case: 13.8" x 6.3" x 4.7" (35 x 16 x 12 cm)
Weight
Meter: 7 oz (200 g); Meter with case: 2.75 lb (1.25 kg)

Ordering Information

Catalog number	Description	Included
WD-35645-10	C101 pH colorimeter kit	Meter, dropper bottle with premixed reagent for 50 tests, sample vials, batteries, and hard carrying case
WD-35645-12	C102 cyanuric acid colorimeter kit	Meter, foil pack reagents for 100 tests, sample vials, batteries, and hard carrying case
WD-35645-13	C103 chlorine dioxide colorimeter kit	Meter, foil pack reagents for 100 tests, sample vials, batteries, and hard carrying case
WD-35645-14	C104 bromine colorimeter kit	Meter, foil pack reagents for 100 tests, sample vials, batteries, and hard carrying case
WD-35645-15	C105 ozone colorimeter kit	Meter, foil pack reagents for 100 tests, sample vials, batteries, and hard carrying case

Applications

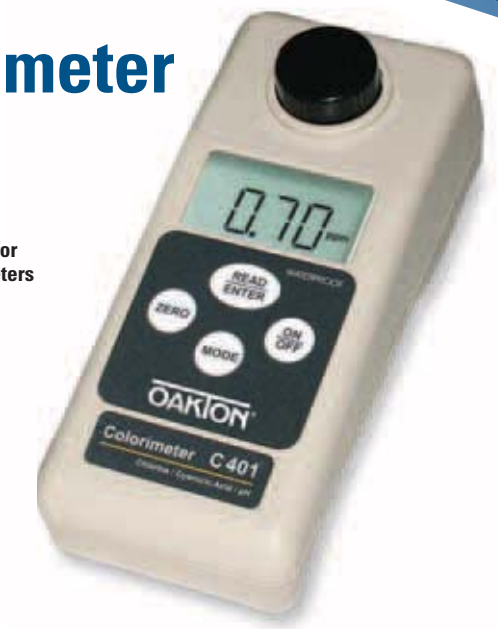
pH Testing: Ideal for applications where pH electrode maintenance is a problem.
Pool and Spa: Great for testing pool water.
Disinfectant Strength: For industrial and water applications.

Replacement Reagents

WD-35645-60 pH reagent includes dropper bottle with reagent for 50 tests
WD-35645-62 Cyanuric acid reagent includes individual foil packs for 100 tests
WD-35645-64 Free chlorine reagent includes individual foil packs for 100 tests
WD-35645-66 Total chlorine reagent includes individual foil packs for 100 tests
WD-35645-68 Chlorine dioxide reagent (glycine) includes individual foil packs for 100 tests

C201, C301 and C401 Multiparameter Colorimeters

Multiparameter measurement for convenient field testing



Right: C401 colorimeter

Below: C301 colorimeter with case and reagents for multiparameter colorimeters

Convenient, foil pack reagents
- Follows US EPA method 330.5 for wastewater, and Standard Method 4500-Cl G for drinking water

Simple to use
- One-time blanking for multiple measurements

Waterproof and dustproof IP67 housing
- Even the sample chamber is waterproof

Compact size
- Take your Oakton colorimeter anywhere!

No detachable parts and no light shield required
- Vial cap prevents stray light from affecting readings

Large, easy-to-read display
- Large, custom LCD displays readings with units of measure and user-friendly message codes that guide meter operation

Advanced power-supply management
- Measures over 1200 samples with a single set of batteries, delivering quick stable results in less than six seconds. Also features auto-off function.

Sturdy carrying case with accessories
- Compact carrying case includes all items necessary for colorimeter measurements and protects the meter when not in use

Specifications

Mode	C201 colorimeter	C301 colorimeter	C401 colorimeter
Chlorine (free and total)			
Range	0 to 1.99 ppm; 2.0 to 6.0 ppm	0 to 1.99 ppm; 2.0 to 6.0 ppm	0 to 1.99 ppm; 2.0 to 6.0 ppm
Resolution	0.01 ppm; 0.1 ppm	0.01 ppm; 0.1 ppm	0.01 ppm; 0.1 ppm
Accuracy	±0.02 ppm, ±0.2 ppm	±0.02 ppm, ±0.2 ppm	±0.02 ppm, ±0.2 ppm
pH			
Range	—	5.9 to 8.2 pH	5.9 to 8.2 pH
Resolution	—	0.1 pH	0.1 pH
Accuracy	—	±0.1 pH	±0.1 pH
Cyanuric acid			
Range	—	—	5 to 90 ppm
Resolution	—	—	1 ppm
Accuracy	—	—	1 ppm

Light source: light emitting diode (LED)
Wavelength: 525 nm
Detector: silicon photodiode
Absorbance range: 0 to 2.5 Abs
Photometric precision: ±0.0015 Abs
Calibration points: user-selectable, one point per colorimetric test
Sample volume required: 10 mL (0.33 oz)
Display: 4-digit, 14-segment, customized LCD with annunciators
Operating temperature range: 0 to 50°C (32 to 122°F)
Operating humidity range: 0 to 90% RH, noncondensing at 30°C (86°F)
Power supply: four AAA alkaline batteries (included)
Battery life: >3000 tests
Electromagnetic compliance: (EMC) EN 61326
Dimensions
Meter: 6.1"L x 2.7"W x 1.8"H (15.5 x 6.8 x 4.6 cm)
Meter with case: 13.8" x 6.3" x 4.7" (35 x 16 x 12 cm)
Weight
Meter: 7 oz (200 g); Meter with case: 2.75 lb (1.25 kg)

Ordering Information

Cat. no.	Description	Includes
WD-35645-20	C201 chlorine colorimeter kit	Meter, foil pack reagents (100 each for free chlorine and total chlorine), sample vials, batteries, and hard carrying case
WD-35645-30	C301 chlorine/pH colorimeter kit	Meter, foil pack reagents (100 each for free chlorine and total chlorine), pH dropper bottle reagent (50 tests), sample vials, batteries, and hard carrying case
WD-35645-40	C401 chlorine/pH/ cyanuric acid colorimeter kit	Meter, foil pack reagents (100 each for free chlorine, total chlorine, and cyanuric acid), pH dropper bottle reagent (50 tests), sample vials, batteries, and hard carrying case

Applications

Water Quality: Use for testing drinking water or wastewater applications.
Environmental/Agricultural: Use for checking water in lakes and streams.
Pool and Spa: Complete water testing for your pool water.
Educational: Ideal for quick, accurate tests in labs and schools.

Replacement Reagents and Secondary Standards

WD-35645-60 pH reagent includes dropper bottle with reagent for 50 tests
WD-35645-62 Cyanuric acid reagent includes individual foil packs for 100 tests
WD-35645-64 Free chlorine reagent includes individual foil packs for 100 tests
WD-35645-66 Total chlorine reagent includes individual foil packs for 100 tests
WD-35645-70 Chlorine secondary standard, includes set of four vials

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