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HANNA Handheld Colorimeters

The HANNA Checker®HC bridges the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. The Checker®HC is both accurate and affordable.

The contoured style of the Checker®HC fits in your palm and pocket perfectly and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

The Checker®HC is extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the Checker®HC, press the button and read the results. It's that easy.

- **Easier to use and more accurate than chemical test kits**

High accuracy

Large, easy to read digits

Auto shut off

- **Dedicated to a single parameter**

Designed to work with HANNA's reagents

Uses 10 mL glass cuvettes

- **Small size, big convenience**

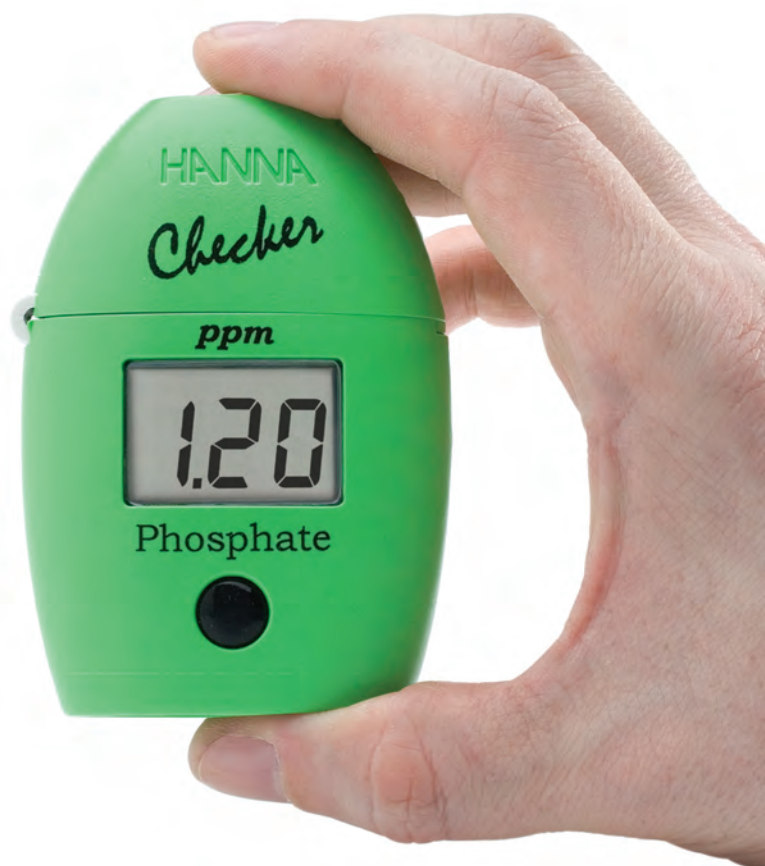
Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits in your palm or pocket

Use for quick and accurate on the spot analysis

Single button operation: zero and measure

Operated by a single AAA battery

The Checker®HC is very simple to use:



PARAMETER	CODE	PAGE
Checker®HC Handheld Colorimeters		
Alkalinity	HI 755	1.12
Chlorine, Free	HI 701	1.13
Chlorine, Total	HI 711	1.13
Chromium VI, High Range	HI 723	1.14
Color of Water	HI 727	1.15
Fluoride, Low Range	HI 729	1.16
Fluoride, High Range	HI 739	1.16
Iodine	HI 718	1.17
Iron	HI 721	1.18
Nickel, High Range	HI 726	1.19
Nitrite, Ultra Low Range	HI 764	1.20
Phosphate, Low Range	HI 713	1.21
Phosphate, High Range	HI 717	1.21
Phosphorus, High Range	HI 706	1.22
Phosphorus, Ultra Low Range	HI 736	1.22
Silica, High Range	HI 770	1.23

HANNA Chemical Test Kits

HANNA test kits are a simple way to perform an accurate chemical analysis. The wide variety of single parameter test kits presented in this section includes colorimetric, checker disc, titration and turbidimetric methods.

Quick and easy to use, HANNA colorimetric chemical test kits are the ideal solution for water analysis of many chemical parameters. The kits are equipped with a transparent container which has the color scale right next to the sample being tested. This makes the color comparison process simple and error free. The reagents are either liquid or powder depending on the parameter to be measured.

HANNA Checker® Disc test kits use the technology of colorimetric kits to provide greater accuracy and resolution. The Checker® Disc is a color comparison wheel shaded from dark to light in proportion to the concentration of the chemical parameter being tested. The user just needs to put both the blank and the reacted cuvettes inside the Checker® Disc. By turning the wheel, the user can then visually find the concentration that best equals the reacted sample. This technique enhances resolution and accuracy.

These precise kits are easy to use without any loss of resolution and accuracy. To determine the concentration of the chemical parameter, these kits utilize a titration technique which consists of counting the number of drops of titrant necessary to cause a color change in the sample. The endpoint can be determined with enhanced accuracy and simplicity.

HANNA test kits are supplied ready to use, complete with all the necessary accessories. They are designed to help you to work better, faster and safer.

All HANNA chemical test kits use color coded dropper bottles which are easy to recognize during analysis. Dropper bottles make titration extremely quick and easy without compromising accuracy.

With some kits, a plastic beaker is provided featuring a ported cap to prevent spills and waste.

Every kit is manufactured according to the highest quality standards and a Safety Data Sheet (SDS) is available for each product, online.

Comprehensive Instructions

Every chemical test kit is supplied with a comprehensive, easy to understand instruction manual. The manuals guide you through the analysis step-by-step, making it easy for even non-technical personnel to perform tests.



Designed for Specific Applications

HANNA combination chemical test kits are tailor made for specific applications:

- Olive Oil Acidity
- Acid Mining
- Agriculture
- Alkalinity - Acidity
- Aquaculture and Aquariums
- Boiler Feedwater
- Cooling Systems and Boilers
- Education
- Environmental Testing
- Swimming Pools
- Water Quality

Tailor made for your application

HANNA multiparameter test kits include all the necessary reagents and accessories for their specific application.

Ideal for field measurements

These multiparameter test kits from HANNA are equipped with step-by-step, easy to understand instruction manuals. A hard carrying case helps to keep your equipment neat, organized and easy to carry around in the field. Our carrying cases are rugged, built to last, and easily refilled with replacement reagents as needed.

One more advantage: HANNA's exclusive pHep® for pH measurements

For those kits that offer pH measurements, HANNA has included the exclusive pHep® electronic tester so that your pH analysis will always be quick and reliable. Traditional pH test strips have limited accuracy and do not cover the entire pH range. Due to the pHep's long life, high accuracy and extended range, these problems are avoided.

HANNA Checker®HC Series

Product Spotlights

HI 701 • HI 711

Free and Total Chlorine Handheld Colorimeters

1.13

Chlorine is the most common water disinfectant. The monitoring of chlorine is crucial in applications such as swimming pools and spas, fruit and vegetable sanitation, disinfection and drinking water. By monitoring this crucial parameter, serious health and safety risks can be avoided.

These Checker®HC portable handheld colorimeters feature a resolution of 0.01 ppm (250 points for free chlorine, 350 for total chlorine) and ± 0.03 ppm (mg/L) $\pm 3\%$ of reading accuracy. They also use an EPA approved DPD method.

The HI 711 and HI 701 Checker®HC's are extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the Checker®HC, press the button and read the results. It's that easy.



HI 721

Iron Handheld Colorimeter

1.18

About 6.3% of the earth's crust is made of iron, of which 43% is in soils. The analysis of iron is often performed to monitor ground water and irrigation waters as a gauge of corrosion from industrial settling, and as an indication of the effectiveness of treatment from mining leachate.

The new HI 721 Checker®HC portable handheld colorimeter features a resolution of 0.01 ppm (500 points) and ± 0.04 ppm $\pm 2\%$ of reading accuracy. The HI 721 Checker®HC uses an adaptation of Standard Method 315 B.

The HI 721 Checker®HC is extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the HI 721 Checker®HC, press the button and read the results. It's that easy.



HI 736

Phosphorus Ultra Low Range Handheld Colorimeter

1.22

All photosynthetic organisms and well as photosynthetic harborers require organic and inorganic phosphorus (as phosphate) in the aquarium system. Plants, algae and phytoplankton require this nutrient for nourishment and utilize phosphorous as a component of cell tissue.

The HI 736 Checker®HC portable handheld colorimeter features a resolution of 1 ppb and ± 5 ppb $\pm 5\%$ of reading accuracy and uses an adaptation of Standard Method Ascorbic Acid for marine applications.

The HI 736 Checker®HC is extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the HI 736 Checker®HC, press the button and read the results. It's that easy.



Chemical Test Kits

Product Spotlights



HI 3897

Olive Oil Acidity Test Kit

1.25

Acidity (expressed as percent oleic acid) is the most fundamental measurement of olive oil. It is the primary indicator of olive oil purity and freshness.

Normally, testing acidity is a complicated process requiring the use of various chemicals in a laboratory environment. HANNA has simplified this process in an easy to understand test kit that can be used by almost anyone to produce quick and accurate results.

With the HI 3897 test kit, it is possible to easily and accurately test the quality of olive oil at various stages of processing and storage to monitor and maintain the highest quality.



HI 3814

Environmental Monitoring Test Kit

1.58

HI 3814 is equipped with all the accessories and reagents to perform over 100 tests for each parameter.

The pHep®, our popular pH electronic tester, is included for your convenience. This small and easy to use pH meter will provide more accurate and reliable pH readings than conventional litmus paper. The pHep® also has the added benefit of introducing students to the use of a pH meter.

The kit is supplied complete with a step-by-step instruction manual and a hard carrying case which makes it easy to perform tests in the field.



HI 3899BP

Backpack Lab™ Marine Science Educational Test Kit

1.63

Backpack Lab™ is designed with all the necessary components in one place, reducing the chance of misplacing an item. Ideal for transporting, take this durable backpack to the field for on-site measurements.

This kit is designed to provide a complete unit for teachers to introduce students to important marine science topics. The teacher's guide provides detailed background information for marine science lessons/activities that can be adapted to various grade levels. Field tests are included to complement classroom lessons. All materials fit easily into the supplied backpack for easy transport.

Quick Reference Charts

SINGLE PARAMETER TEST KITS

PARAMETER	METHOD	RANGE	# OF TESTS	CODE	PAGE
Acidity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	110 avg.	HI 3820	1.24
Acidity Total Exchangeable	titration	0.0-2.5 meq/100 g	100	HI 38084	1.24
Acidity (as Oleic acid %)	titration	0.00 - 1.00 % acidity	6	HI 3897	1.25
Alkalinity (as CaCO ₃) Phenolphthalein and Total	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110 avg.	HI 3811	1.27
Alkalinity (as CaCO ₃), Total	titration	0-500 gpg	100	HI 38014	1.27
Alkalinity (as CaCO ₃), Phenolphthalein and Total	titration	0.0-10.0 gpg 0.0-20.0 gpg	200	HI 38013	1.27
Ammonia (as NH ₃ -N) (Fresh Water)	colorimetric	0.0-2.5 mg/L (ppm)	25 avg.	HI 3824	1.28
	checker disc	0.0-3.0 mg/L (ppm)	100	HI 38049	1.28
Ammonia (as NH ₃ -N) (Salt Water)	colorimetric	0.0-2.5 mg/L (ppm)	25 avg.	HI 3826	1.28
Ascorbic Acid	titration	10-200 mg/L (ppm)	100 avg.	HI 3850	1.29
Boron	titration	0.0-5.0 mg/L (ppm)	100	HI 38074	1.29
Bromine	colorimetric	0.0-3.0 mg/L (ppm)	60 avg.	HI 3830	1.30
Calcium (irrigation water)	turbidimetric	0-125 mg/L (ppm) 0-250 mg/L (ppm)	100	HI 38086	1.30
Ca & Mg (Irrigation Water)	titration	>0.0 meq/L	100 avg.	HI 38081	1.30
Ca & Mg (Soil)	titration	>0.0 meq/100 g	100 avg.	HI 38080	1.30
Carbon Dioxide	titration	0.0-10.0 mg/L (ppm)	110 avg.	HI 3818	1.31
		0.0-50.0 mg/L (ppm)			
		0-100 mg/L (ppm)			
Chloride (as Cl ⁻) for COD testing	visual	1000 mg/L (ppm) (ISO) 2000 mg/L (ppm) (EPA)	100	HI 3898	1.31
Chloride (as Cl ⁻)	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	110 avg.	HI 3815	1.32
	titration	500-10000 mg/L (ppm) 5000-100000 mg/L (ppm)	100	HI 38015	1.32
Chlorine Free	colorimetric	0.0-2.0 mg/L (ppm)	50 avg.	HI 3829F	1.33
	colorimetric	0.0-2.5 mg/L (ppm)	50 avg.	HI 3831F, HI 3831F/S	1.33
	checker disc	0.0-3.5 mg/L (ppm)	100	HI 3875	1.33
	checker disc	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm)	200	HI 38018	1.33
Chlorine Free & pH	colorimetric	Cl ₂ : 0.0-2.5 mg/L (ppm) pH: 6.0-8.5 pH	50 avg. 100	HI 3887	1.33
Chlorine Free & Total	checker disc	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm)	200	HI 38017	1.33
	checker disc	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm) 0.0-10.0 mg/L (ppm)	200	HI 38020	1.33
	colorimetric	0.0-2.5 mg/L (ppm)	50	HI 3831T, HI 3831T/S	1.34
Chlorine Total	checker disc	0.0-3.5 mg/L (ppm)	100	HI 38016	1.34
	checker disc	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm)	200	HI 38019	1.34
	titration	0.0-4.0 mg/L (ppm) 0-20 mg/L (ppm)	100	HI 38022	1.34
Chlorine Total & pH	titration	10-200 mg/L (ppm)	100	HI 38023	1.34
	colorimetric	Cl ₂ : 0.0-2.5 mg/L (ppm) pH: 6.0-8.5 pH	50 100	HI 3888	1.34
	colorimetric	0-100 mg/L (ppm) 100-1000 mg/L (ppm)	100 avg.	HI 3845	1.35
Chromium (as Cr ⁶⁺)	colorimetric	0.0-1.0 mg/L (ppm)	100 avg.	HI 3846	1.35

SINGLE PARAMETER TEST KITS					
PARAMETER	METHOD	RANGE	# OF TESTS	CODE	PAGE
Copper	colorimetric	0.0-2.5 mg/L (ppm)	100	HI 3847	1.36
	colorimetric	0.00-0.25 mg/L (ppm)	100	HI 3856	1.36
	colorimetric	0.00-0.25 mg/L (ppm) 0.0-6.0 mg/L (ppm)	100	HI 38075	1.36
Cyanide (as CN ⁻)	checker disc	0.00-0.30 mg/L (ppm)	100	HI 3855	1.37
Cyanuric Acid	turbidimetric	10-100 mg/L (ppm)	100	HI 3851	1.37
Detergents (as ABS/LAS*)	checker disc	0.00-1.30 mg/L (ppm)	35	HI 3857	1.38
Formaldehyde	titration	0.00-1.00% 0.0-10.0%	110 avg.	HI 3838	1.38
Glycol	visual	Present/Absent	25	HI 3859	1.38
Hardness (as CaCO ₃) Total	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	100 avg.	HI 3812	1.39
	titration	0-150 mg/L (ppm)	50 avg.	HI 3840	1.39
	titration	40-500 mg/L (ppm)	50 avg.	HI 3841	1.39
	titration	400-3000 mg/L (ppm)	50 avg.	HI 3842	1.39
	titration	0-30 gpg	100	HI 38033	1.39
	titration	0.0-20.0 gpg 0.0-20.0 mg/L (ppm)	100	HI 38034	1.39
Hardness (as CaCO ₃) Total & Calcium	titration	Total: 0.0-20.0 gpg Ca: 0.0-20.0 gpg	100	HI 38035	1.39
Hydrazine	checker disc	0.00-1.00 mg/L (ppm)	100	HI 3849	1.40
Hydrogen Peroxide	titration	0.00-2.00 mg/L 0.0-10.0 mg/L	100 avg.	HI 3844	1.40
Hydroxide (as OH ⁻)	titration	0.00-1.00 g/L (ppt) 0.0-10.0 g/L (ppt)	110 avg.	HI 3839	1.40
Hypochlorite (as Cl ₂)	titration	50-150 g/L (ppt)	100 avg.	HI 3843	1.41
Iodine	colorimetric	0.0-2.5 mg/L (ppm)	50 avg.	HI 3832	1.41
	colorimetric	0-5 mg/L (ppm)	100	HI 3879	1.41
Iron	colorimetric	0-5 mg/L (ppm)	50 avg.	HI 3834	1.42
	checker disc	0.00-1.00 mg/L (ppm)	100	HI 38039	1.42
	checker disc	0.0-5.0 mg/L (ppm)	100	HI 38040	1.42
	checker disc	0.0-10.0 mg/L (ppm)	100	HI 38041	1.42
Iron and Total Hardness	colorimetric titration	Fe: 0-5 mg/L (ppm) TH: 40-500 mg/L (ppm)	50 avg.	HI 3889	1.42
Magnesium (Irrigation Water)	titration	0.0-240.0 mg/L (ppm) 0.0-725.0 mg/L (ppm)	100 avg.	HI 38079	1.43
Manganese	checker disc	0.0-3.0 mg/L (ppm)	100	HI 38042	1.43
	checker disc	0.0-10.0 mg/L (ppm)	100	HI 38072	1.43
Nitrate (as NO ₃ ⁻ -N)	colorimetric	0-50 mg/L (ppm)	100	HI 3874	1.44
Nitrate (as NO ₃ ⁻ -N) (Irrigate Water and Soil)	checker disc	water: 0-50 mg/L (ppm) soil: 0-60 mg/L (ppm)	100 100	HI 38050	1.44

*ABS = Alkyl Benzene Sulfonate; LAS = Linear Alkyl Sulfonate

Quick Reference Charts

SINGLE PARAMETER TEST KITS					
PARAMETER	METHOD	RANGE	# OF TESTS	CODE	PAGE
Nitrite (as NO ₂ ⁻ -N)	colorimetric	0.0-1.0 mg/L (ppm)	100	HI 3873	1.45
	checker disc	0.00-0.50 mg/L (ppm)	100	HI 38051	1.45
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110 avg.	HI 3810	1.45
Ozone	checker disc	0.0-2.3 mg/L (ppm)	100	HI 38054	1.45
pH	checker disc	3.0-5.0 pH	200	HI 3882	1.46
	colorimetric	4.0-6.5 pH	100	HI 3880, HI 3880/0*	1.46
	color card	4.0-8.0 pH	200	HI 3881-5	1.46
	colorimetric	6.0-8.5 pH	100	HI 3881, HI 3881/0*	1.46
	colorimetric	7.5-10.0 pH	100	HI 3886	1.46
	colorimetric	7.5-10.0 pH	100	HI 3886/0	1.46
	checker disc	4.0-10.0 pH	300	HI 38058	1.46
Phenols	checker disc	0.00-1.00 mg/L (ppm) 0.5-5.0 mg/L (ppm)	100	HI 3864	1.47
Phosphate (PO ₄ ³⁻)	colorimetric	0-5 mg/L (ppm)	50	HI 3833	1.47
	checker disc	0.0-5.0 mg/L (ppm)	100	HI 38077	1.47
	checker disc	0.00-1.00 mg/L (ppm) 0.0-5.0 mg/L (ppm) 0-50 mg/L (ppm)	100	HI 38061	1.47
Phosphorus (Soil)	checker disc	0.0-130.0 mg/L (ppm)	100	HI 38073	1.48
Potassium (Soil)	turbidimetric	0-50 mg/L (ppm) 50-250 mg/L (ppm)	100	HI 38082	1.48
Salinity	titration	0.0-40.0 g/kg (ppt)	110 avg.	HI 3835	1.49
Sodium Adsorption Ratio (SAR)	DIST®4+ test kit	> 0.0 meq/L	100 avg.	HI 38078	1.49
Sodium Exchangeable (EES) and Gypsum Requirement (GR)	titration	EES: 0.00-56.40 meq/100 g soil GR: 0.0-213.0 metric ton/ha	100	HI 38083	1.49
Silica	checker disc	0.00-1.00 mg/L (ppm)	100	HI 38066	1.50
	checker disc	0-40 mg/L (ppm) 0-800 mg/L (ppm)	100	HI 38067	1.50
Sulfate (as SO ₄ ²⁻)	turbidimetric	20-100 mg/L (ppm)	100	HI 38000	1.50
	titration	100-1000 mg/L (ppm) 1000-10000 mg/L (ppm)	200	HI 38001	1.50
Sulfite (as Na ₂ SO ₃)	titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	110 avg.	HI 3822	1.51
Zinc	colorimetric	0.0-3.0 mg/L (ppm)	100	HI 3854	1.51
	checker disc	0.0-4.0 mg/L (ppm) 0.0-20.0 mg/L (ppm)	100	HI 38076	1.51

*contains dechlorinating reagent

MULTIPARAMETER TEST KITS				
PARAMETER	METHOD	RANGE	# OF TESTS	PAGE
HI 3819 Acid Mining Test Kit				
Acidity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	110 avg.	1.52
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110 avg.	
Iron	colorimetric	0-5 mg/L (ppm)	50	
pH	electronic pH tester	0.0-14.0 pH	life of the meter	
HI 3813 Alkalinity and Acidity Test Kit				
Acidity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	110 avg.	1.52
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110 avg.	
HI 3895 Agriculture Test Kit, Basic				
Nitrogen	colorimetric	traces, low, medium, high	10	1.54
Phosphorus	colorimetric	traces, low, medium, high	10	
pH	colorimetric	4 to 9 pH (1 pH increments)	10	
Potassium	turbidimetric	traces, low, medium, high	10	
HI 3896 Agriculture Test Kit, Pro				
Nitrogen	colorimetric	traces, low, medium, high	25	1.54
Phosphorus	colorimetric	traces, low, medium, high	25	
pH	colorimetric	4 to 9 pH (1 pH increments)	25	
Potassium	turbidimetric	traces, low, medium, high	25	
HI 3823 Combination Test Kit for Aquaculture				
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110 avg.	1.55
Carbon Dioxide	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	110 avg.	
Hardness (as CaCO ₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	100 avg.	
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110 avg.	
pH	electronic pH tester	0.0-14.0 pH	life of the meter	
Salinity	titration	0.0-40.0 g/Kg (ppt)	110 avg.	
HI 3893 Aquarium Test Kit				
Ammonia (as NH ₃ -N)	colorimetric	0.0-2.5 mg/L (ppm)	50	1.55
Nitrate (as NO ₃ ⁻ -N)	colorimetric	0-50 mg/L (ppm)	50	
Nitrite (as NO ₂ ⁻ -N)	colorimetric	0.0-1.0 mg/L (ppm)	50	
pH	colorimetric	6.0-8.5 pH	50	
HI 3816 Boiler Test Kits				
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110 avg.	1.56
Chloride (as Cl ⁻)	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	110 avg.	
Hardness (as CaCO ₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	100 avg.	

Quick Reference Charts

MULTIPARAMETER TEST KITS

PARAMETER	METHOD	RANGE	# OF TESTS	PAGE	
HI 3827 Boiler Test Kits					
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110 avg.	1.56	
Chloride (as Cl ⁻)	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	110 avg.		
Hardness (as CaCO ₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	100 avg.		
Phosphate	colorimetric	0-5 mg/L (ppm)	50		
pH	electronic pH tester	0.0-14.0 pH	life of the meter		
Sulfite (as Na ₂ SO ₃)	titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	110 avg.		
HI 3828 Boiler Test Kits					
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110 avg.	1.56	
Chloride (as Cl ⁻)	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	110 avg.		
Hardness (as CaCO ₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	100 avg.		
Iron	colorimetric	0-5 mg/L (ppm)	50		
pH	electronic pH tester	0.0-14.0 pH	life of the meter		
HI 3837 Boiler Test Kits					
Phosphate	colorimetric	0-5 mg/L (ppm)	50	1.56	
pH	electronic pH tester	0.0-14.0 pH	life of the meter		
Sulfite (as Na ₂ SO ₃)	titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	110 avg.		
HI 3821 Cooling and Boiler Combination Test Kit					
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110 avg.	1.57	
Chloride (as Cl ⁻)	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	110 avg.		
Hardness (as CaCO ₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	100 avg.		
Phosphate	colorimetric	0-5 mg/L (ppm)	50 avg.		
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110 avg.		
Sulfite (as Na ₂ SO ₃)	titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	110 avg.		
HI 3814 Environmental Monitoring Test Kit					
Acidity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	110 avg.	1.58	
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110 avg.		
Carbon Dioxide	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	110 avg.		
Hardness (as CaCO ₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	100 avg.		
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110 avg.		
pH	electronic pH tester	0.0-14.0 pH	life of the meter		
HI 3825 Combination Swimming Pool Test Kit					
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110 avg.		1.59
Bromine	colorimetric	0.0-3.0 mg/L (ppm)	60 avg.		
Chlorine, Free/Total	colorimetric	0.0-2.5 mg/L (ppm)	50 avg.		
pH	electronic pH tester	0.0-14.0 pH	life of the meter		

MULTIPARAMETER TEST KITS

PARAMETER	METHOD	RANGE	# OF TESTS	PAGE	
HI 3887, HI 3888 Quick-check Swimming Pool Test Kits					
Free Chlorine	colorimetric	0-2.5 mg/L (ppm)	50 avg.	1.59	
Total Chlorine	colorimetric	0-2.5 mg/L (ppm)	50 avg.		
pH	colorimetric	6.0-8.5 pH	100 avg.		
HI 3817 Water Quality Test Kit					
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110 avg.	1.60	
Chloride (as Cl ⁻)	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	110 avg.		
Hardness (as CaCO ₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	100 avg.		
Iron	colorimetric	0-5 mg/L (ppm)	50		
pH	electronic pH tester	0.0-14.0 pH	life of the meter		
Sulfite (as Na ₂ SO ₃)	titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	110 avg.		
HI 3817BP Backpack Lab™ Water Quality Educational Test Kit					
Acidity (CaCO ₃)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	110	1.61	
Alkalinity (CaCO ₃) Phenolphthalein & Total	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110		
Carbon Dioxide	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	110		
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110		
Hardness (CaCO ₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	100		
Nitrate (NO ₃ ⁻ -N)	colorimetric	0-50 mg/L (ppm)	100		
Phosphate	colorimetric	0-5 mg/L (ppm)	50		
pH	electronic pH tester	0.0-14.0 pH	life of meter		
EC	electronic ED/TDS tester	0-3999 µS/cm	life of meter		
TDS	electronic ED/TDS tester	0-12.000 ppm	life of meter		
Temperature	electronic tester (included with pH & EC/TDS tester)	0.0-60.0°C	life of meter		
Turbidity	secchi disc	-	-		
HI 3896BP Backpack Lab™ Soil Quality Educational Test Kit					
Nitrogen	colorimetric	traces, low, medium, high	50	1.62	
Phosphorus	colorimetric	traces, low, medium, high	50		
Potassium	turbidimetric	traces, low, medium, high	50		
pH	colorimetric	4 to 9 pH (1 pH increments)	50		
	electronic pH tester	0.0-14.0 pH	life of meter		
EC	electronic EC tester	0 to 3999 µS/cm	life of meter		
TDS	electronic TDS tester	0 to 2000 ppm	life of meter	1.63	
Temperature	electronic temperature tester	-50.0 to 220°C	life of meter		
HI 3899BP Backpack Lab™ Marine Science Educational Test Kit					
Acidity (CaCO ₃)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	110		
Alkalinity (CaCO ₃) Phenolphthalein & Total	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	110		
Ammonia (as NH ₃ -N) in salt water	colorimetric	0.0-2.5 mg/L (ppm)	25 avg.		
Carbon Dioxide (CO ₂)	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	110		
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110		
Nitrite	colorimetric	0.0-1.0 mg/L (ppm)	100		
Nitrate (NO ₃ ⁻ -N)	colorimetric	0-50 mg/L (ppm)	100		
Phosphate (PO ₄ ³⁻)	colorimetric	0-5 mg/L (ppm)	50		
Salinity	titration	0.0-40.0 g/kg	110		
Turbidity	secchi disc	-	-		

HI 755

Alkalinity Handheld Colorimeter

Alkalinity is one of the most important parameters to measure in salt water aquariums. It helps to maintain a stable pH, an important factor for most aquatic life. In seawater, bicarbonate is the largest contributor to alkalinity. Bicarbonate is a critical element needed for healthy corals. Corals need bicarbonate and carbonate available to form their skeletons. Without an adequate level, healthy coral growth is not possible. Since bicarbonate levels can be difficult to determine, total alkalinity is determined instead. The alkalinity of natural seawater is typically 125 ppm CaCO_3 (7dKH). In salt water aquariums typical alkalinity values can range from 125 to 200 ppm CaCO_3 (7-11.2 dKH).

The HANNA HI 755 Checker®HC bridges the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and have low resolution while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. The HANNA HI 755 Checker®HC is accurate and affordable.

The Checker®HC features an accuracy of ± 5 ppm (mg/L) $\pm 5\%$ of reading and uses the colorimetric method.

The contoured style of this Checker®HC fits in your palm and pocket perfectly and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

The HI 755 Checker®HC is extremely simple to use. After zeroing the instrument with your water sample, add the reagent to the cuvette and gently invert 5 times. Then insert the cuvette into the HI 755 Checker®HC and press the button to read the results. It's that easy.



Easier to use and more accurate than chemical test kits

- Colorimetric method
- Accuracy ± 5 ppm $\pm 5\%$ of reading
- 1 ppm (mg/L) resolution
- Large, easy to read digits
- Auto shut off

Dedicated to a single parameter

- Designed to work with HANNA's liquid reagents
- Uses 10 mL glass cuvettes

Small size, big convenience

- Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket
- Use for quick and accurate on the spot analysis
- Single button operation: zero and measure
- Operated by a single AAA battery

Ideal for

- Saltwater aquariums

ORDERING INFORMATION

HI 755 Checker®HC is supplied with (2) sample cuvettes with caps, liquid reagents for alkalinity (25 tests approx.), syringe with tip, battery and instructions.

REAGENTS AND STANDARDS

- HI 755-26 Reagents for 25 tests (alkalinity)
- HI 755-11 Calibration checking set
0 and 100 ppm (alkalinity)

ACCESSORIES

- HI 731318 Cuvette cleaning cloth (4)
- HI 731321 Glass cuvettes (4)
- HI 731225 Caps for cuvettes (4)
- HI 93703-50 Cuvette cleaning solution, 230 mL

SPECIFICATIONS

	HI 755 (Alkalinity)
Range	0 to 300 ppm (mg/L)
Resolution	1 ppm (mg/L)
Accuracy @ 25°C/77°F	± 5 ppm (mg/L) $\pm 5\%$ of reading
Light Source	LED @ 610 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")
Weight	64 g (2.25 oz.)
Method	colorimetric method

Free and Total Chlorine Handheld Colorimeters

1

HANNA CHECKER®HC SERIES AND CHEMICAL TEST KITS

Checker^{HC}
handheld colorimeter



Easier to use and more accurate than chemical test kits

- EPA approved DPD method
- ±0.03 ppm ±3% of reading accuracy
- 0.01 ppm resolution (250 points for free chlorine, 350 for total chlorine)
- Large, easy to read digits
- Auto shut off

Small size, big convenience

- The Checker^{HC} easily fits into the palm of your hand or pocket
- Use for quick and accurate on the spot analysis
- Single button operation: zero and measure
- Operated by a single AAA battery

Dedicated to a single parameter

- Designed to work with HANNA's powder reagents
- Uses 10 mL glass cuvettes

Ideal for:

- Swimming pools and spas, fruit and vegetable sanitation, disinfection, drinking water and quality control checks

SPECIFICATIONS	HI 711 (Total Chlorine)	HI 701 (Free Chlorine)
Range	0.00 to 3.50 ppm (mg/L)	0.00 to 2.50 ppm (mg/L)
Resolution	0.01 ppm (mg/L)	
Accuracy @ 25°C/77°F	±0.03 ppm ±3% of reading	
Light Source	LED @ 525 nm	
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after two minutes of non-use and ten seconds after reading	
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")	
Weight	64 g (2.25 oz.)	
Method	adaptation of USEPA method 330.5, DPD method	

Chlorine is the most common water disinfectant. The monitoring of chlorine is crucial in applications such as swimming pools and spas, fruit and vegetable sanitation, disinfection and drinking water. By monitoring this crucial parameter, serious health and safety risks can be avoided.

The HANNA HI 711 and HI 701 Checker^{HC}s bridge the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. The HANNA HI 711 and HI 701 Checker^{HC}s are accurate and affordable.

These Checker^{HC} portable handheld colorimeters feature a resolution of 0.01 ppm (250 points for free chlorine, 350 for total chlorine) and ±0.03 ppm (mg/L) ±3% of reading accuracy. They also use an EPA approved DPD method.

The contoured style of these Checker^{HC}s fit in your palm and pocket perfectly and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

The HI 711 and HI 701 Checker^{HC}s are extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the Checker^{HC}, press the button and read the results. It's that easy.

ORDERING INFORMATION

HI 711 Checker^{HC} is supplied with sample cuvettes with caps (2), powder reagents for Total Chlorine (6), battery and instructions.

HI 701 Checker^{HC} is supplied with sample cuvettes with caps (2), powder reagents for Free Chlorine (6), battery and instructions.

REAGENTS AND STANDARDS

- HI 711-25** Reagents for 25 tests (Total Cl₂)
- HI 701-25** Reagents for 25 tests (Free Cl₂)
- HI 711-11** Calibration checking set
0.00 and 1.00 ppm (Total Cl₂)
- HI 701-11** Calibration checking set
0.00 and 1.00 ppm (Free Cl₂)

ACCESSORIES

- HI 731318** Cuvette cleaning cloth (4)
- HI 731321** Glass cuvettes (4)
- HI 731225** Caps for cuvettes (4)
- HI 93703-50** Cuvette cleaning solution, 230 mL

HI 723

Chromium VI High Range Handheld Colorimeter

There are two natural forms of ionic chromium, the hexavalent ion, Cr (VI) and the trivalent Cr (III). Cr (III) is much less toxic than Cr (VI) and seldom found in potable waters. Cr (VI), however, is toxic to humans and is found in water. Even though the toxic effects from Cr (VI) in drinking water are not well documented, it is a suspected carcinogen.

There are many industries that use chromic acid and other forms of Cr (VI) that could be a possible source of Cr (VI) pollution in either water or air or both. One industry that can introduce Cr (VI) to water sources is the chrome-plating industry (for the plating of car bumpers). Chromic acid is used in the electroplating process and can be present in industrial waste waters. Cr (VI) also can enter water supplies from industrial cooling towers where chromic acid is added to the water to inhibit metal corrosion.

The maximum permissible level of Cr (VI) allowed to be released into the waterways is 50 ppb. Its level in drinking water is normally much lower and a level higher than 3 ppb is suggestive of industrial pollution.

By monitoring this parameter with the HANNA HI 723 Checker®HC, serious health and safety risks can be avoided.

The HI 723 Checker®HC is extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent, shake vigorously for 10 seconds. Last, place the vial into the Checker®HC, press the operational button for about 3 seconds and the display will show the countdown prior to the measurement or, alternatively, wait for 6 minutes and press operational button. When the timer ends the meter will perform the reading. The Checker®HC displays concentration in ppb of chromium VI. It's that easy.

ORDERING INFORMATION

HI 723 Checker®HC is supplied with sample cuvettes with caps (2 ea.), powder reagents for chromium VI HR (6), battery and instructions.

REAGENTS AND STANDARDS

HI 723-25	Reagents for 25 tests
HI 723-11	Calibration checking set (0 and 300 ppb chromium VI)

ACCESSORIES

HI 731318	Cuvette cleaning cloth (4)
HI 731321	Glass cuvettes (4)
HI 731225	Caps for cuvettes (4)
HI 93703-50	Cuvette cleaning solution, 230 mL



Easier to use and more accurate than chemical test kits

- Diphenylcarbohydrazide method
- Accuracy ± 5 ppb $\pm 5\%$ of reading
- 1 ppb ($\mu\text{g/L}$) resolution
- Large, easy to read digits
- Auto shut off

Dedicated to a single parameter

- Designed to work with HANNA's powder reagents
- Uses 10 mL glass cuvettes

Small size, big convenience

- Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket
- Use for quick and accurate on the spot analysis
- Single button operation: zero and measure
- Operated by a single AAA battery

Ideal for

- Water quality

SPECIFICATIONS	HI 723 (Chromium VI High Range)
Range	0 to 999 ppb
Resolution	1 ppb
Accuracy @ 25°C/77°F	$\pm 5\%$ of reading ± 5 ppb
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")
Weight	64 g (2.25 oz.)
Method	adaptation of the ATSM, Manual of Water and Environmental Technology, D 1687-92, Diphenylcarbohydrazide method

Color of Water Handheld Colorimeter



True color is caused by dissolved compounds in water. It can be natural or artificial. Dissolved and suspended solids (together) cause apparent color. Color is measured in Platinum-Cobalt units. The AWWA recommends ≤ 15 PCU.

The term "color" is used here to mean true color, that is, the color of water from which turbidity has been removed. The term "apparent color" includes not only color due to substances in solution, but also color that is due to suspended matter. Apparent color is determined on the original sample without filtration or centrifugation. In some highly colored industrial wastewaters, color is contributed principally by colloidal or suspended material. In such cases both true color and apparent color should be determined.

To determine color by currently accepted methods, turbidity must be removed before analysis. Methods for removing turbidity without removing color vary. Filtration yields results that are reproducible from day to day among laboratories, however, some filtration procedures may also remove some true color. Centrifugation avoids interaction of color with filter materials, but results vary with the sample nature and size and speed of the centrifuge. When sample dilution is necessary, whether it precedes or follows turbidity removal, it can alter the measured color. Acceptable pretreatment procedures are included with each method. State the pretreatment method when reporting results.

The HI 727 Checker®HC is extremely simple to use. First, zero the instrument with deionized water. Next, prepare the sample according to the Apparent/True color measurement. Place the second vial with prepared sample into the Checker®HC, press the operational button and the HI 727 Checker®HC displays the color of water in PCU.

ORDERING INFORMATION

HI 727 Checker®HC is supplied with sample cuvettes with caps (2 ea.), battery and instructions

REAGENTS AND STANDARDS

HI 740230	Deionized water, 230 mL
HI 727-11	Calibration checking set (0 and 150 PCU)

ACCESSORIES

HI 731318	Cuvette cleaning cloth (4)
HI 731321	Glass cuvettes (4)
HI 731225	Caps for cuvettes (4)
HI 93703-50	Cuvette cleaning solution, 230 mL

Easier to use and more accurate than chemical test kits

- Diphenylcarbohydrazide method
- Accuracy ± 10 PCU ± 5 % of reading
- 5 PCU resolution
- Large, easy to read digits
- Auto shut off

Dedicated to a single parameter

- Uses 10 mL glass cuvettes

Small size, big convenience

- Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket
- Use for quick and accurate on the spot analysis
- Single button operation: zero and measure
- Operated by a single AAA battery

Ideal for

- Water quality

SPECIFICATIONS	HI 727 (Color of Water)
Range	0 to 500 PCU
Resolution	5 PCU
Accuracy @ 25°C/77°F	$\pm 5\%$ of reading ± 10 PCU
Light Source	LED @ 470 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")
Weight	64 g (2.25 oz.)
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 21th edition, Colorimetric Platinum Cobalt method

Fluoride Low Range and High Range Handheld Colorimeters

Fluoride is one of the very few chemicals that have been shown to cause significant effects in people through drinking-water. Fluoride has beneficial effects on teeth at low concentrations in drinking-water, but excessive exposure to fluoride in drinking-water, or in combination with exposure to fluoride from other sources, can give rise to a number of adverse effects.

Water fluoridation is the controlled addition of fluoride to a public water supply to reduce tooth decay. Fluoridated water operates on tooth surfaces: in the mouth it creates low levels of fluoride in saliva, which reduces the rate at which tooth enamel demineralizes and increases the rate at which it remineralizes in the early stages of cavities.

A 1994 World Health Organization expert committee suggested a level of fluoride from 0.5 to 1.0 mg/L, depending on climate. Bottled water typically has unknown fluoride levels, and some domestic water filters remove some or all fluoride.

The HI 729 Checker®HC is simple to use. For this measurement you need 2 vials (#1 and #2); in both vials add 2 mL of reagent and until the mark: deionized water in vial #1 and sample in vial #2, and gently invert 5 times, and wait 2 minutes. Then insert the cuvette #1 into the HI 729 Checker®HC and press the button to zero; after that cuvette #2 to read the measurement results.

The HI 739 Checker®HC is simple to use. In one vial add 2 ml of Reagent A and 8 ml of Reagent B; gently invert 5 times, and wait 1 minute, then zero the instrument with the vial. After zeroing, remove the vial and add 1 ml of sample, gently invert 5 times, wait 1 minute, then insert the cuvette into the HI 739 Checker®HC and press the read button for results.

ORDERING INFORMATION

HI 729 Checker®HC is supplied with sample cuvettes with caps (2), reagents for 6 tests, syringe with tip, battery and instructions.

HI 739 Checker®HC is supplied with sample cuvettes with caps (2), reagents for 4 tests, syringe with tip, pipette, battery and instructions.

REAGENTS AND STANDARDS

HI 729-26	Reagents for 25 tests (Fluoride LR)
HI 739-26	Reagents for 25 tests (Fluoride HR)
HI 729-11	Calibration checking set (0 and 1.00 ppm Fluoride)
HI 739-11	Calibration checking set (0 and 10.0 ppm Fluoride)

ACCESSORIES

HI 731318	Cuvette cleaning cloth (4)
HI 731321	Glass cuvettes (4)
HI 731225	Caps for cuvettes (4)
HI 93703-50	Cuvette cleaning solution, 230 mL

Checker^{HC}
handheld colorimeter



Easier to use and more accurate than chemical test kits

SPADNS method

HI 729: ± 0.05 ppm $\pm 5\%$ of reading accuracy

HI 739: ± 0.5 ppm $\pm 5\%$ of reading accuracy

Large, easy to read digits

Auto shut off

Dedicated to a single parameter

Designed to work with HANNA's reagents

Uses 10 mL glass cuvettes

Small size, big convenience

Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket

Use for quick and accurate on the spot analysis

Single button operation: zero and measure

Operated by a single AAA battery

Ideal for:

Water quality

SPECIFICATIONS	HI 729 (Fluoride LR)	HI 739 (Fluoride HR)
Range	0.00 to 2.00 ppm	0.0 to 20.0 ppm
Resolution	0.01 ppm	0.1 ppm
*Accuracy @ 25°C/77°F	± 0.05 ppm $\pm 5\%$ of reading	± 0.5 ppm $\pm 5\%$ of reading
Light Source	LED @ 575 nm	
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after two minutes of non-use and ten seconds after reading	
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")	
Weight	64 g (2.25 oz.)	
Method	adaptation of SPADNS method	

* Excluding sample volume error

Iodine Handheld Colorimeter



Iodine is sometimes used as a disinfectant for swimming pools, spas and potable water. It has also found use as a disinfectant in the poultry industry. The rapid determination of iodine is required for adequate control of this bactericide.

The HANNA Checker®HC's bridge the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. The HANNA HI 718 and Checker®HC is accurate *and* affordable.

The HI 718 Checker®HC portable handheld colorimeter features a resolution of 0.1 ppm and accuracy of ± 0.1 ppm $\pm 5\%$ of reading. This Checker®HC uses a modification of the DPD method used for residual chlorine.

The contoured style of this Checker®HC fits in your palm and pocket perfectly and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

The HI 718 is extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the instrument, press the button and read the results. It's that easy.

The HI 718 is extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the instrument, press the button and read the results. It's that easy.

Easier to use and more accurate than chemical test kits

- DPD method
- ± 0.1 ppm $\pm 5\%$ of reading accuracy
- Large, easy to read digits
- Auto shut off

Dedicated to a single parameter

- Designed to work with HANNA's powder reagents
- Uses 10 mL glass cuvettes

Small size, big convenience

Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket

Use for quick and accurate on the spot analysis

Single button operation: zero and measure

Operated by a single AAA battery

Ideal for:

Swimming pools and spas, industrial processes and disinfection

SPECIFICATIONS	HI 718 (Iodine)
Range	0.0 to 12.5 ppm (mg/L)
Resolution	0.1 ppm (mg/L)
Accuracy @ 25°C/77°F	± 0.1 ppm $\pm 5\%$ of reading
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after two minutes of non-use and ten seconds after reading
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")
Weight	64 g (2.25 oz.)
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, DPD method.

ORDERING INFORMATION

HI 718 Checker®HC is supplied with sample cuvettes with caps (2), powder reagents for iodine (6), battery and instructions.

REAGENTS AND STANDARDS

HI 718-25	Reagents for 25 tests (iodine)
HI 718-11	Calibration checking set 0.0 and 1.0 ppm (iodine)

ACCESSORIES

HI 731318	Cuvette cleaning cloth (4)
HI 731321	Glass cuvettes (4)
HI 731225	Caps for cuvettes (4)
HI 93703-50	Cuvette cleaning solution, 230 mL

HI 721

Iron Handheld Colorimeter

About 6.3% of the earth's crust is made of iron, of which 43% is in soils. The analysis of iron is often performed to monitor ground water and irrigation waters as a gauge of corrosion from industrial settling, and as an indication of the effectiveness of treatment from mining leachate.

The HANNA HI 721 Checker®HC bridges the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. The HANNA HI 721 Checker®HC is accurate *and* affordable with immediate results.

The new HI 721 Checker®HC portable handheld colorimeter features a resolution of 0.01 ppm (500 points) and ± 0.04 ppm $\pm 2\%$ of reading accuracy. The HI 721 Checker®HC uses an adaptation of Standard Method 315 B.

The contoured style of this Checker®HC fits in your palm and pocket perfectly and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

The HI 721 Checker®HC is extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the HI 721 Checker®HC, press the button and read the results. It's that easy.

ORDERING INFORMATION

HI 721 Checker®HC is supplied with sample cuvettes with caps (2), powder reagents for iron (6), battery and instructions.

REAGENTS AND STANDARDS

HI 721-25	Reagents for 25 tests (iron)
HI 721-11	Calibration checking set 0.00 and 1.00 ppm (iron)

ACCESSORIES

HI 731318	Cuvette cleaning cloth (4)
HI 731321	Glass cuvettes (4)
HI 731225	Caps for cuvettes (4)
HI 93703-50	Cuvette cleaning solution, 230 mL



Easier to use and more accurate than chemical test kits

- Phenanthroline method
- ± 0.04 ppm $\pm 2\%$ of reading accuracy
- 0.01 ppm (mg/L) resolution (500 points)
- Large, easy to read digits
- Auto shut off

Dedicated to a single parameter

- Designed to work with HANNA's powder reagents
- Uses 10 mL glass cuvettes

Small size, big convenience

- Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket
- Use for quick and accurate on the spot analysis
- One button operation: zero and measure
- Operated by a single AAA battery

Ideal for:

- Industrial, ground and treated waters, mining leachate monitoring and agricultural irrigation water

SPECIFICATIONS	HI 721 (Iron)
Range	0.00 to 5.00 ppm (mg/L)
Resolution	0.01 ppm (mg/L)
Accuracy @ 25°C/77°F	± 0.04 ppm $\pm 2\%$ of reading
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after three minutes of non-use and ten seconds after reading
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")
Weight	64 g (2.25 oz.)
Method	adaptation of the EPA Phenanthroline method 315 B, for natural and treated waters.

Nickel High Range Handheld Colorimeter

Checker^{HC}
handheld colorimeter



Easier to use and more accurate than chemical test kits

- Photometric method
- ± 0.10 g/L $\pm 5\%$ of reading accuracy
- 0.01 g/L resolution (700 points)
- Large, easy to read digits
- Auto shut off

Dedicated to a single parameter

- Designed to work with HANNA's powder reagents
- Uses 10 mL glass cuvettes

Small size, big convenience

- Weighing a mere 64 g (2.25 oz.), the Checker^{HC} easily fits into the palm of your hand or pocket
- Use for quick and accurate on the spot analysis
- One button operation: zero and measure
- Operated by a single AAA battery

Ideal for:

- Steel manufacturing, electroplating and electronics production

Nickel is extensively used in electroplating, the manufacturing of steel, electronic devices, ceramics and colored glasses. It plays a vital role in many processes of applied sciences and fundamental sciences. It necessitates development of rapid methods for estimation of nickel.

Nickel is seldom found in natural waters, but often present in industrial wastewater as a direct by-product of metal plating baths, and as a corrosion by-product of stainless steel, nickel or cobalt alloys.

The most serious effects of nickel, such as lung cancer and nasal sinus have occurred in people who have breathed nickel dust while working in nickel refineries or in nickel processing plants. The levels of nickel in the workplace were much higher than background levels. The Department of Health and Human Services has determined that nickel and certain nickel compounds may be reasonably anticipated to be carcinogens. The International Agency for Research on Cancer (IARC) has determined that some nickel compounds are carcinogenic to humans and that metallic nickel may possibly be carcinogenic to humans. The EPA has determined that nickel refinery dust and nickel subsulfide are human carcinogens. Other lung effects including chronic bronchitis and reduced lung function have been observed in workers breathing nickel.

The HI 726 Checker^{HC} is extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent, shake gently until complete dissolution. Last, place the vial into the Checker^{HC}, press the operational button for about 3 seconds. The display will show the countdown prior to the measurement or, alternatively, wait for 1 minute and press operational button. When the timer ends the meter will perform the reading and display concentration in g/L of nickel. It's that easy.

SPECIFICATIONS	HI 726 (Nickel HR)
Range	0.00 to 7.00 g/L
Resolution	0.01 g/L
Accuracy @ 25°C/77°F	± 0.10 g/L $\pm 5\%$ of reading
Light Source	LED @ 575 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after three minutes of non-use and ten seconds after reading
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")
Weight	64 g (2.25 oz.)
Method	adaptation of the photometric method

ORDERING INFORMATION

HI 726 Checker^{HC} is supplied with sample cuvettes with caps (2 ea.), powder reagents for Nickel HR (6), battery and instructions.

REAGENTS AND STANDARDS

- HI 726-25 Reagents for 25 tests (Nickel HR)
- HI 726-11 Calibration checking set (0 and 3.50 Nickel HR)

ACCESSORIES

- HI 731318 Cuvette cleaning cloth (4)
- HI 731321 Glass cuvettes (4)
- HI 731225 Caps for cuvettes (4)
- HI 93703-50 Cuvette cleaning solution, 230 mL

HI 764

Nitrite Ultra Low Range Handheld Colorimeter

Nitrification is the biological oxidation of ammonia (ammonium ion) into nitrite followed by the oxidation of the nitrites to nitrates. The first step of this 2 step process is carried out in an aquarium by nitrifying bacteria. During this quick process, the ammonium levels drop while the nitrite levels increase. Since nitrite is just as harmful as ammonia, nitrite levels should be maintained at immeasurable levels. A mature biological filter should be able to keep nitrite levels low.

Also, if tap water is to be used in an aquarium, it is recommended that it be tested for phosphate, as well as silicate, ammonia, nitrate, nitrite, pH, and alkalinity.

The HANNA HI 764 Checker®HC bridges the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. The HANNA HI 764 Checker®HC is accurate *and* affordable.

The HI 764 Checker®HC portable handheld colorimeter features a resolution of 1 ppb and uses an adaptation of EPA Diazotization method 354.1.

The contoured style of this Checker®HC fits in your palm and pocket perfectly and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

The HI 764 Checker®HC is extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the HI 764 Checker®HC, press the button and read the results. It's that easy.

ORDERING INFORMATION

HI 764 Checker®HC is supplied with sample cuvettes with caps (2), powder reagents for phosphorus (6), battery and instructions.

REAGENTS AND STANDARDS

HI 764-25	Reagents for 25 tests (nitrite)
HI 764-11	Calibration checking set (0 and 100 ppb nitrite)

ACCESSORIES

HI 731318	Cuvette cleaning cloth (4)
HI 731321	Glass cuvettes (4)
HI 731225	Caps for cuvettes (4)
HI 93703-50	Cuvette cleaning solution, 230 mL

Checker[®]HC
handheld colorimeter



Easier to use and more accurate than chemical test kits

- Adaptation of EPA Diazotization method
- $\pm 10 \text{ ppb} \pm 4\%$ of reading accuracy
- 1 ppb resolution (200 points)
- Large, easy to read digits
- Auto shut off

Dedicated to a single parameter

- Designed to work with HANNA's powder reagents
- Uses 10 mL glass cuvettes

Small size, big convenience

- Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket
- Use for quick and accurate on the spot analysis
- Single button operation: zero and measure
- Operated by a single AAA battery

Ideal for:

- Aquaculture

SPECIFICATIONS	HI 764 (Nitrite ULR)
Range	0 to 200 ppb
Resolution	1 ppb
Accuracy @ 25°C/77°F	$\pm 10 \text{ ppb} \pm 4\%$ of reading
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after two minutes of non-use
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")
Weight	64 g (2.25 oz.)
Method	adaptation of the EPA Diazotization method 354.1

Phosphate Handheld Colorimeters

1

HANNA CHECKER®HC SERIES AND CHEMICAL TEST KITS

Checker^{HC}
handheld colorimeter



Easier to use and more accurate than chemical test kits

- Ascorbic acid method for HI 713, amino acid method for HI 717
- HI 713: ± 0.04 ppm $\pm 4\%$ of reading accuracy
- HI 717: ± 1.0 ppm $\pm 5\%$ of reading accuracy
- Large, easy to read digits
- Auto shut off

Dedicated to a single parameter

- Designed to work with HANNA's reagents
- Uses 10 mL glass cuvettes

Small size, big convenience

- Weighing a mere 64 g (2.25 oz.), the Checker^{HC} easily fits into the palm of your hand or pocket
- Use for quick and accurate on the spot analysis
- Single button operation: zero and measure
- Operated by a single AAA battery

Ideal for:

- Aquaculture, natural, waste, drinking waters and agriculture

Orthophosphates are found in natural and wastewaters. They are commonly added to drinking water as a corrosion inhibitor. The instantaneous analysis of orthophosphate by colorimetric determination provides rapid results using a standard analysis technique.

These HANNA HI 713 and HI 717 Checker^{HC} bridge the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give only some points resolution while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. The HANNA HI 713 and HI 717 Checker^{HC}s are accurate and affordable.

The HI 713 Checker^{HC} portable handheld colorimeter features a resolution of 0.01 ppm (250 points) and ± 0.04 ppm (mg/L) $\pm 4\%$ of reading accuracy. The HI 713 Checker^{HC} uses an adaptation of Standard Method 4500-P E, Ascorbic Acid method.

The HI 717 Checker^{HC} portable handheld colorimeter features a resolution of 0.1 ppm (300 points) and ± 1.0 ppm (mg/L) $\pm 5\%$ of reading accuracy. The HI 717 Checker^{HC} uses an adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Amino Acid method.

The HI 713 and HI 717 Checker^{HC}s are extremely simple to use. First, zero the instrument with your water sample. Next, add the reagents. Last, place the vial into the Checker^{HC}, press the button and read the results. It's that easy.

ORDERING INFORMATION

HI 713 Checker^{HC} is supplied with sample cuvettes with caps (2), powder reagents for phosphate (6), battery and instructions.

HI 717 Checker^{HC} is supplied with sample cuvettes with caps (2), reagents for 20 tests, battery and instructions.

REAGENTS AND STANDARDS

- HI 713-25** Reagents for 25 tests (Phosphate LR)
- HI 717-25** Reagents for 40 tests (Phosphate HR)
- HI 713-11** Calibration checking set (0.00 and 1.00 ppm phosphate)
- HI 717-11** Calibration checking set (0.0 and 15.0 ppm phosphate)

ACCESSORIES

- HI 731318** Cuvette cleaning cloth (4)
- HI 731321** Glass cuvettes (4)
- HI 731225** Caps for cuvettes (4)
- HI 93703-50** Cuvette cleaning solution, 230 mL

SPECIFICATIONS	HI 713 (Phosphate LR)	HI 717 (Phosphate HR)
Range	0.00 to 2.50 ppm (mg/L)	0.0 to 30.0 ppm (mg/L)
Resolution	0.01 ppm (mg/L)	0.1 ppm (mg/L)
Accuracy @ 25°C/77°F	± 0.04 ppm (mg/L) $\pm 4\%$ of reading	± 1.0 ppm (mg/L) $\pm 5\%$ of reading
Light Source	LED @ 525 nm	
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after two minutes of non-use and ten seconds after reading	
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")	
Weight	64 g (2.25 oz.)	
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 20th edition, Ascorbic Acid method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Amino Acid method

HI 736 • HI 706

Phosphorus Handheld Colorimeters

Plants, algae and phytoplankton require phosphorus for nourishment and utilize phosphorous as a component of cell tissue. When organic matter such as plant tissue, dead fish, algae or uneaten food breaks down aerobically (with oxygen), phosphate is produced and results in rapid oxygen depletion of aquarium water, which in turn suffocates aquatic life and compounds the problem.

Phosphorus concentration in water is monitored because it causes corrosion when present in levels too high.

Both the HANNA HI 736 and HI 706 Checker®HC's bridge the gap between simple chemical test kits and professional instrumentation. The HANNA HI 736 (for marine applications) and HI 706 (for fresh water applications) are both accurate and affordable.

The HI 736 Checker®HC portable handheld colorimeter features a resolution of 1 ppb and ± 5 ppb $\pm 5\%$ of reading accuracy and uses an adaptation of Standard Method Ascorbic Acid.

The HI 736 and HI 706 Checker®HC's are extremely simple to use. First, zero the instrument with your water sample. Next, add the reagents. Last, place the vial into the Checker®HC, press the button and read the results. It's that easy.

ORDERING INFORMATION

HI 736 Checker®HC is supplied with sample cuvettes with caps (2), powder reagents for phosphorus (6), battery and instructions.

HI 706 Checker®HC is supplied with sample cuvettes with caps (2), reagents for 20 tests, battery and instructions.

REAGENTS AND STANDARDS

HI 736-25	Reagents for 25 tests (Phosphorus ULR)
HI 706-25	Reagents for 40 tests (Phosphorus HR)
HI 736-11	Calibration checking set (0 and 100 ppb phosphorus)
HI 706-11	Calibration checking set (0.0 and 7.5 ppm phosphorus)

ACCESSORIES

HI 731318	Cuvette cleaning cloth (4)
HI 731321	Glass cuvettes (4)
HI 731225	Caps for cuvettes (4)
HI 93703-50	Cuvette cleaning solution, 230 mL



Easier to use and more accurate than chemical test kits

Ascorbic acid method for HI 736, amino acid method for HI 706

HI 736: ± 5 ppb $\pm 5\%$ of reading accuracy

HI 706: ± 0.2 ppm $\pm 5\%$ of reading accuracy

Large, easy to read digits

Auto shut off

Dedicated to a single parameter

Designed to work with HANNA's reagents

Uses 10 mL glass cuvettes

Small size, big convenience

Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket

Use for quick and accurate on the spot analysis

Single button operation: zero and measure

Operated by a single AAA battery

Ideal for:

Aquaculture

SPECIFICATIONS	HI 736 (Phosphorus ULR)	HI 706 (Phosphorus HR)
Range	0 to 200 ppb	0.0 to 15.0 ppm
Resolution	1 ppb	0.1 ppm
Accuracy @ 25°C/77°F	± 5 ppb $\pm 5\%$ of reading	± 0.2 ppm $\pm 5\%$ of reading
Light Source	LED @ 525 nm	
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after two minutes of non-use and ten seconds after reading	
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")	
Weight	64 g (2.25 oz.)	
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 20Th edition, Ascorbic Acid method.	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Amino Acid method

Silica High Range Handheld Colorimeter

Checker^{HC}
handheld colorimeter



Easier to use and more accurate than chemical test kits

- Adaptation of EPA Diazotization method
- ±2 ppm ±5% of reading accuracy
- 1 ppm resolution (200 points)
- Large, easy to read digits
- Auto shut off

Dedicated to a single parameter

- Designed to work with HANNA's powder reagents
- Uses 10 mL glass cuvettes

Small size, big convenience

- Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket
- Use for quick and accurate on the spot analysis
- Single button operation: zero and measure
- Operated by a single AAA battery

Ideal for:

- Aquaculture

Silica is the name given to silicon dioxide, SiO₂. Silicon, Si, is the most abundant element in the Earth's crust, 28% of it by weight. Silicon is never found free form in nature. In crystallized form it is only reactive under conditions of extremely high temperatures. Water and water vapor probably have little influence upon silicon solubility, because a protective surface layer of silicon dioxide is rapidly formed. Silicon binds with other elements to form various species of silica and silicate. The concentration of the soluble silica molecules are important to aquaculture because they influence (and limit) the growth of diatoms.

In most waters, the predominant form of dissolved silica is monosilicic acid, which incorporates 2 water molecules.

The HANNA HI 770 Checker®HC is accurate and affordable. This portable handheld colorimeter features a resolution of 1 ppm (200 points) and ±2 ppm ±5% of reading accuracy.

The contoured style of the HI 770 Checker®HC fit in your palm and pocket perfectly and the large LCD is easy to read. The auto shut off feature assures the battery life will not be drained if you forget to turn it off.

The HI 770 Checker®HC is simple to use. First, zero the instrument with your water sample. Next, add the reagents in order, respecting all the indications. Last, place the vial into the Checker®HC, press the operational button for about 3 seconds and the display will show the countdown prior to the measurement or, alternatively, wait for 2 minutes after last reagent adding and press operational button. The Checker®HC displays concentration in ppm of Silica as SiO₂.

SPECIFICATIONS	HI 770 (Silica HR)
Range	0 to 200 ppm
Resolution	1 ppm
Accuracy @ 25°C/77°F	±2 ppm ±5% of reading
Light Source	LED @ 470 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after two minutes of non-use
Dimensions	81.5 x 61 x 37.5 mm (3.2 x 2.4 x 1.5")
Weight	64 g (2.25 oz.)
Method	adaptation of the USEPA METHOD 370.1 for drinking, surface and saline waters, domestic and industrial wastes and Standard Method 4500-SiO ₂ C

ORDERING INFORMATION

HI 770 Checker®HC is supplied with sample cuvettes with caps (2 ea.), powder reagents for 6 tests, battery and instructions.

REAGENTS AND STANDARDS

HI 770-25	Reagents for 25 tests (Silica HR)
HI 770-11	Calibration checking set (0 and 100 ppm)

ACCESSORIES

HI 731318	Cuvette cleaning cloth (4)
HI 731321	Glass cuvettes (4)
HI 731225	Caps for cuvettes (4)
HI 93703-50	Cuvette cleaning solution, 230 mL

Acidity

HI 3820 Acidity Test Kit

With the use of diluted sodium hydroxide as the titrant and bromphenol blue or phenolphthalein indicators, the contribution of strong or organic acids can be determined. The measurement of the strong acid contribution to the sample acidity is known as methyl orange acidity. This is carried out by titrating with sodium hydroxide until the solution turns from yellow to green/blue (pH endpoint about 4.5). The total acidity caused by both mineral and organic acids is determined by titrating to an endpoint pH of 8.3, using phenolphthalein as an indicator. This is known as phenolphthalein acidity.

HI 38084 Total Exchangeable Acidity Test Kit

The total exchangeable acidity (TEA) is a measure of the amount of acidic cations (hydrogen, aluminum, iron and manganese) present in soil. It is expressed in milliequivalent per 100 grams (meq/100 g) of soil. The more acidic it is a soil, the lower the soil pH value will be. Soils in humid regions normally accumulate increasing amounts of exchangeable acidity as they get older. Soil acidity may develop toxicity that can damage or kill plants.

The extraction method is the potassium chloride method. The acidic cations are firstly leached from the soil and then titrated with a standard alkali. The reaction endpoint is visually indicated by a color change (from colorless to pink) of the indicator reagent.

ORDERING INFORMATION

HI 3820 test kit comes with 10 mL dechlorinating reagent, bromophenol blue indicator, phenolphthalein indicator, acidity titrant, 10 mL calibrated vessel, 50 mL calibrated vessel, and calibrated syringe.

HI 38084 test kit comes with 380 g potassium chloride, 20 mL phenolphthalein indicator, 120 mL titrant solution, 12 L demineralized water bottle with filter cap, 1 mm soil sieve, large funnel, 100 paper filter discs, 50 mL plastic test tube with screw cap, 50 mL calibrated plastic vessel, 2 g sample cups (2), 1 g sample cup, plastic pipette, brush and spoon

ACCESSORIES

HI 3820

HI 3820-100 Spare reagent for 100 tests

HI 38084

HI 38084-100 Spare reagent for 100 tests



HI 3820 Acidity

Today, our water supplies are becoming more contaminated with corrosive chemicals from industrial dumping or acid rain. Therefore, acidity measurements are an essential monitoring device to define and control pollution in sewers, lakes and rivers. Acidity of water is equally important to monitor in soils and fish farming to maximize the growing environment. The HANNA acidity test kit is equipped with all you need to determine acidity of water. This makes it practical for field as well as laboratory use. The design makes the kit easy to handle and, except for acidity titrant, practically prevents accidental injury or damage due to spills.

The **acidity** of a water sample is its capacity to neutralize hydroxide ions. Acidity may be caused by mineral acids such as sulfuric acid or hydrochloric acid or by dissolved carbon dioxide. Most commonly in drinking water, Carbon dioxide is the principal cause of acidity in drinking water, but also it can be caused by mineral and organic acids. Acidity increases the corrosive behavior of water. Drinking water with a high acidity level is likely to be corrosive to copper water pipes and to the solder which joins those pipes. High levels of copper and lead in drinking water often occur when acidic water stands in pipes for extended periods of time (such as over night). In addition to creating a possible health hazard due to dissolved metal ions, acidity in water can cause copper plumbing to develop pin hole leaks after a few years.

METHOD	RANGE*	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3820 Acidity (as CaCO₃)					
titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	1 mg/L (ppm) 5 mg/L (ppm)	methyl-orange/ phenolphthalein	110 avg.	910 g
HI 38084 Acidity Total Exchangeable					
titration	0.0-2.5 meq/100 g	0.1 meq/100 g	extraction method: potassium chloride	100	1027 g

* 1 gpg = 17 ppm CaCO₃

Olive Oil Acidity Test Kit



Now there is an easy, affordable and accurate way to determine the quality, classification and freshness of your olive oil.

Acidity (expressed as percent oleic acid) is the most fundamental measurement of olive oil. It is the primary indicator of olive oil purity and freshness.

The quality of olive oil is directly related to the degree of breakdown of the fatty acids in the oil. As the bound fatty acids break down, free fatty acids are formed which increase the acidity of the % oil. Acidity, expressed as oleic acid, is a measure of the free fatty acid present in the oil, which is directly related to its purity.

The quality of olive oil can be adversely affected during maturation or by environmental conditions. Mishandling, processing and bruising during harvesting can also contribute to a breakdown of fatty acids and an increase in free acidity. Improper and/or long term storage can cause olive oil to breakdown and become rancid. Regular acidity testing is the best way to ensure and maintain quality and freshness.

Normally, testing acidity is a complicated process requiring the use of various chemicals in a laboratory environment. HANNA has simplified this process in an easy to understand test kit that can be used by almost anyone to produce quick and accurate results.

Studies have shown that the quality of olive oil has a direct impact on its health benefits. *Extra Virgin Olive Oil* contains higher levels of antioxidants, particularly phenols and vitamin E (because it is less processed). Antioxidants can help prevent oxidation damage to body tissue caused by free radicals. Studies have also shown that the oxidation of LDL (bad) cholesterol is associated with the hardening of arteries that can lead to heart disease.

With the HI 3897 test kit, it is possible to easily and accurately test the quality of olive oil at various stages of processing and storage to monitor and maintain the highest quality.

Acidity, defined as percent oleic acid, is a parameter that indicates olive oil freshness. A high acidity value indicates the oil quality has diminished and is at risk of becoming rancid.

Acidity is used to discriminate an extra virgin olive oil from all other olive oils. According to the CEE 2568/91 regulation, olive oil is considered extra virgin when its acidity level is below 1%. A low acidity value also indicates a natural extraction process occurred soon after olive harvesting.

The HI 3897 kit utilizes a titration method where the endpoint is visually determined when the color changes from yellow-green to pink.

CHEMICAL PARAMETERS

Olive Storage Period (between harvesting and extraction)	within 48 hours	2 to 4 days	over 4 days
Acidity (as oleic acid %)	0.3	0.4	0.5



The HI 180 is a compact and lightweight magnetic stirrer which incorporates electronic controls that allow the user to regulate the speed with precision. In addition to speed control, HANNA's Speedsafe™ system will assure that the maximum speed is never exceeded.

HI 3897 • Olive Oil Acidity Test Kit

In accordance with the European Community (EC) reg. CEE2568/91 quality classification of olive oil based on acidity (expressed as percent oleic acid) is as follows:

Extra Virgin Olive Oil: Acidity $\leq 1\%$

"Perfect flavor and odor", with a maximum acidity, expressed as oleic acid, of 1 g/100 g

Virgin Olive Oil: Acidity 1 - 2%

"Perfect flavor and odor", with a maximum acidity, expressed as oleic acid, of 2 g/100 g

Ordinary Virgin Olive Oil:**Acidity 2 - 3.3% (tolerance of 10%)**

"Good flavor and odor", with a maximum acidity, expressed as oleic acid, of 3.3 g/100 g

Virgin Lampante Olive Oil: + 3.3%. Not fit for human consumption

"Off flavor and odor", with a maximum acidity, expressed as oleic acid, > 3.3 g/100 g

Sensory Quality of Olive Oil

The sensory analysis of virgin olive oil is based on a panel test, developed by the International Olive Oil Council. The rating is awarded on the basis of a scale of points running from 0, which indicates that the oil has extreme defects to 9, which indicates that the oil has no defects at all. See the following chart for sensory ratings of each grade of olive oil.

Extra Virgin Oil	>6.5
Virgin	>5.5
Ordinary Virgin	>3.5
Virgin Lampante	<3.5

ORDERING INFORMATION

HI 3897 is supplied with 6 ready-to-use bottles of organic solvent, HI 180MB magnetic stirrer, calibrated syringe for oil dosing, calibrated syringe for titrant dosing, titrant (30 mL bottle), rugged carrying case and instructions.

ACCESSORIES

HI 3897-010	Spare kit for 10 tests
HI 740226	5 mL calibrated syringe
HI 740142	1 mL calibrated syringe
HI 740143	1 mL calibrated syringe (6)
HI 740144	Tip for 1 mL calibrated syringe (6)
HI 740053	100 mL graduated glass bottle (10)
HI 731319	Magnetic stir bar for HI 180 (10)



Additional Technical Information:

Olive oil is a complex compound made of fatty acids, vitamins, volatile components, water soluble components and microscopic bits of olive. The 3 primary fatty acids (triglycerides) are oleic, linoleic, and linolenic.

Oleic Acid (18:1) = 55 ~ 85% olive oil composition

Linoleic Acid (18:2) = 3.5 ~ 21.00% olive oil composition

Linolenic Acid (18:3) = 0.0 ~ 1.5% olive oil composition

Oleic acid makes up 55-85% of olive oil. Oleic acid is the most abundant fatty acid found in nature.

Studies show that high concentrations of oleic acid can lower blood levels of total and LDL (bad) cholesterol, reducing the long term risk of heart disease.

Olive Oil Acid Composition

Palmitic Acid (16:0) = 7.5 - 20%
Palmitoleic Acid (16:1) = 0.3 - 3.5%
Stearic Acid (18:0) = 0.5 - 5.0%
Oleic Acid (18:1) = 55.0 - 83.0 %
Linoleic Acid (18:2) = 3.5 - 21.0%
Linolenic Acid (18:3) = 0.0 ~ 1.5%
Others = 1.5 - 3.2%

SPECIFICATIONS	HI 3897
Range	0.00 - 1.00 % acidity
Smallest Increment	0.01 mL = 0.01%
Method	titration
Sample Size	4.6 mL (4 g)
Number of Tests	6
Dimensions (kit)	112 x 390 x 318 mm (4.4 x 15.4 x 12.5")
Weight (kit)	3 kg (6.6 lb.)

SPECIFICATIONS	HI 180 Magnetic Stirrer (incl.)
Maximum Stirring Capacity	1 L (0.26 g)
Speed Range	100 rpm min.; 1000 rpm max
Installation Category	II
Cover Material	ABS plastic
Environment	0 to 50°C (32 to 122°F) 95% RH max
Dimensions	dia. 137 mm x 51 mm (h) (5.39 x 2")
Weight	640 g (1.4 lbs.)

**HI 3811 Alkalinity Phenolphthalein and Total**

Alkalinity is the quantitative capacity of a water sample to neutralize an acid to a set pH. This measurement is very important in determining the corrosive characteristics of water due primarily to hydroxide, carbonate and bicarbonate ions. Other sources of alkalinity can be from anions that can be hydrolyzed such as phosphates, silicates, borates, fluoride and salts of some organic acids. Alkalinity is critical in the treatment of drinking water, wastewater, boiler & cooling systems and soils.

Alkalinity Conversions1 meq/L = 50 mg/L CaCO_3 = 2.8 dKH1 mg/L CaCO_3 = 0.02 meq/L = 0.056 dKH1 dKH = 0.36 meq/L = 17.86 mg/L CaCO_3 **There are three methods of expressing alkalinity generally used:**mg/L CaCO_3 = milligrams of CaCO_3 per liter water

meq/L = milliequivalents per liter

dKH = degrees of carbonate hardness

METHOD	RANGE*	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3811 Alkalinity (as CaCO_3) Phenolphthalein and Total					
titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.	460 g
HI 38014 Alkalinity Total					
titration	0-500 gpg	5 gpg	bromphenol blue	100	363 g
HI 38013 Alkalinity, Phenolphthalein and Total					
titration	0.0-10.0 gpg 0.0-20.0 gpg	0.1 gpg 0.2 gpg	phenolphthalein/ bromphenol blue	200	865 g

* 1 gpg = 17 ppm CaCO_3 **HI 3811 Alkalinity Test Kit**

The HANNA alkalinity test kit makes monitoring easy, quick and safe. The compact size gives the user the versatility to use the kit anywhere. The design makes the kit easy to handle and, except for alkalinity titrant, practically prevents accidental injury or damage due to spills.

Alkalinity can be measured as phenolphthalein alkalinity and total alkalinity. The phenolphthalein alkalinity is determined by neutralizing the sample to a pH of 8.3 using a dilute hydrochloric acid solution, and a phenolphthalein indicator. Since bicarbonate ions can be converted to carbonic acid with additional hydrochloric acid, the phenolphthalein alkalinity measures total hydroxide ions, but only half of the bicarbonate contribution.

HI 38013 Phenolphthalein and Total Alkalinity Test Kit

In this case the phenolphthalein alkalinity is determined by neutralizing the sample to a pH of 8.3 using a dilute sulfuric acid solution and a phenolphthalein indicator. Since bicarbonate ions can be converted to carbonic acid with additional sulfuric acid, the phenolphthalein alkalinity measures total hydroxide ions, but only half of the carbonate contribution.

HI 38014 Total Alkalinity Test Kit

Total alkalinity is determined by neutralizing the sample to a pH of 4.5 using a dilute sulfuric acid solution and a bromophenol blue indicator.

ORDERING INFORMATION

HI 3811 test kit comes with 10 mL phenolphthalein indicator, 10 mL bromophenol blue indicator, 120 mL alkalinity titrant, 10 mL calibrated vessel, 50 mL calibrated vessel, and calibrated syringe with tip.

HI 38013 test kit comes with 10 mL phenolphthalein indicator, 10 mL bromophenol blue indicator, 105 mL alkalinity reagent (2), 20 mL calibrated plastic vessel with cap and 1 mL syringe with tip.

HI 38014 test kit comes with 10 mL bromophenol blue indicator, 110 mL total alkalinity reagent, 20 mL calibrated vessel with cap and 1 mL syringe with cap.

ACCESSORIES**HI 3811****HI 3811-100** Spare reagent for 100 tests**HI 38013****HI 38013-100** Spare reagent for 100 tests**HI 38014****HI 38014-100** Spare reagent for 100 tests

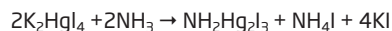
Ammonia

HI 3824 Ammonia Test Kit for Fresh Water

This HANNA ammonia portable test kit determines the ammonia concentration in water in several easy steps. The Nessler reagent reacts with ammonia, under strong alkaline conditions, to form a yellow colored complex.

HI 3826 Ammonia Test Kit for Sea Water

The HANNA ammonia portable test kit determines the ammonia concentration in water in several easy steps. The ammonia level in mg/L (or ppm), ammonia as nitrogen is determined by a colorimetric method. The Nessler reagent reacts with ammonia, under strong alkaline conditions, to form a yellow colored complex (see equation below). An addition of Reagent 1 for Sea Water inhibits precipitation of calcium and magnesium ions due to the presence of the alkaline Nessler reagent. The color intensity of the solution determines the ammonia concentration



HI 38049 Ammonia Test Kit for Fresh Water

The HI 38049 test kit measures ammonia nitrogen concentration up to 3 ppm in fresh waters, employing the Nessler colorimetric method. Ammonia reacts with the reagent in basic solution to form a yellow compound. The absorbance of this colored product is proportional to the concentration of ammonia-nitrogen present in the aqueous sample.

ORDERING INFORMATION

HI 3826 test kit comes with 20 mL plastic beaker, color comparison cube, 20 mL ammonia reagent 1 (for sea water) and 20 mL Nessler reagent.

HI 3824 test kit comes with 20 mL plastic beaker, color comparison cube, 20 mL ammonia reagent 1 (for fresh water) and 20 mL Nessler reagent

HI 38049 test kit comes with 20 mL ammonia reagent (for fresh water), 20 mL Nessler reagent, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

ACCESSORIES

HI 3826

HI 3826-025 Spare reagent for 25 tests

HI 3824

HI 3824-025 Spare reagent for 25 tests

HI 38049

HI 38049-100 Spare reagent for 100 tests



HI 3826 Ammonia in salt water

Ammonia - nitrogen, in the form of NH_3 and NH_4^+ , is often present in water as a component of the nitrogen cycle. In the metabolism of proteins and amino acids, many heterotrophic bacteria, actinomycetes, and fungi (occurring in both soil and water) excrete what for them is excess nitrogen: ammonia. Generally, in unpolluted waters, ammonia and ammonium compounds occur in relatively small quantities, on the order of 0.1 mg/L, while higher levels usually indicate organic pollution. Ammonia is also recognized to be toxic diatoms in the 7.4-8.5 pH range at a level of 1.1 mg/L, and to fish, in the same pH range, at a level of 2.5 mg/L.

In nature, the ammonia level in water can vary. Ground water normally contains ammonia due to bacterial decay of plants and animals. However, the presence of ammonia in surface water may be evidence of sanitary pollution due to waste discharges or natural causes.

Ammonia is commercially used as a fertilizer, either as such or in the form of compounds. Its presence in raw surface waters indicates animal or plant microbiological decay, and it is toxic to fish above certain critical levels.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3824 Ammonia (as NH_3-N) in fresh water					
colorimetric	0.0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	Nessler	25 avg.	180 g
HI 3826 Ammonia (as NH_3-N) in salt water					
colorimetric	0.0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	Nessler	25 avg.	180 g
HI 38049 Ammonia (as NH_3-N) in fresh water					
checker disc	0.0-3.0 mg/L (ppm)	0.1 mg/L (ppm)	Nessler	100	248 g



HI 3850 Ascorbic Acid Test Kit

Ascorbic acid and its sodium, potassium, and calcium salts are commonly used as antioxidant food additives.

Ascorbic acid (Vitamin C) is added as a flavoring and preservative agent to juice-based beverages. This kit is especially designed for the determination of the content in Vitamin C of beverages. It is based on drop-count titration and is practical also with intensively colored samples.

The National Academy of Sciences recommends the consumption of 60 mg of ascorbic acid per day. Vitamin C deficiency, which typically causes abnormalities in bones and teeth, was first characterized in sailors in the eighteenth century. These abnormalities were eliminated by compelling sailors to eat limes, a source of vitamin C. Many vegetables also contain large quantities of vitamin C, but ascorbic acid is commonly destroyed by many cooking processes, and hence citrus fruits are regarded as the most reliable source of vitamin C.

Boron is one of the micronutrients essential for plant growth, animal and humans, although the range between deficiency and excess is narrow. It may be present naturally in water or may find its way into a watercourse through industrial waste effluents. In aqueous environments boron is mainly present as boric acid, which is mostly undissociated. This is why a minimal boron concentration is required in the irrigation water for metabolic activities of the crops. However, excess boron is harmful to plant growth. Boron in excess of 2.0 mg/L in irrigation water is detrimental to many plants, but some plants may even be affected adversely by concentrations lower than 1.0 mg/L.

The US Department of Agriculture reports the following classification:

ppm of Boron	Effect on Crops
<0.5	good (except for very sensitive crops)
0.5-2.0	some risks (many crops must be excluded)
>2.0	dangerous (may only be used for very tolerant crops)

METHOD	RANGE*	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3850 Ascorbic Acid					
titration	10-200 mg/L (ppm)	10 mg/L (ppm)	iodometric	100 avg.	519 g
HI 38074 Boron					
titration	0.0-5.0 mg/L (ppm)	0.2 mg/L (ppm)	boric acid	100	780 g

* 1 gpg = 17 ppm CaCO₃

HI 3850 Ascorbic Acid Test Kit

Ascorbic acid (C₆H₈O₆) undergoes an oxidation reaction with potassium iodate in acidic condition.

The endpoint is indicated by the reaction of iodine with starch suspension, which produces a blue-black product. As long as ascorbic acid is present, the triiodide is quickly converted to iodide ion, and no blue-black iodine-starch product is observed. However, when all the ascorbic acid has been oxidized, the excess triiodide (in equilibrium with iodine) reacts with starch to form the expected blue-black color.

HI 38074 Boron Test Kit

Boric acid/borate react with chemical compounds containing multiple hydroxyls groups (polyols) such as mannitol, generating anionic complexes at the neutral pH of water.

The borate esters are formed and dissociated spontaneously in a variety of pH dependent equilibria. During the release of acidic protons during complexation there is a concomitant decrease of pH which tends to reverse the reaction and thus, in order to maintain stable complexes there is a need to avoid pH decrease. The amount of acidification produced upon the addition of mannitol is proportional to the extent of borate ester formation.

The HI 38074 test kit can determine boron concentration in irrigation waters by direct titration of boric acid.

ORDERING INFORMATION

HI 3850 test kit comes with 100 mL ascorbic acid reagent A, 25 mL starch indicator, 100 mL ascorbic acid reagent C, 50 mL calibrated plastic vessels (2), 3 mL plastic pipette, 1 mL plastic pipette (2) and graduated plastic test tube with cap.

HI 38074 test kit comes with reagent for 100 tests, HI 98103 Checker pocket pH meter, pH 4.01 (1 sachet), pH 7.01 (1 sachet), screwdriver, 120 mL bottle with cap, 50 mL calibrated vessel, and 1 mL plastic pipettes (2).

ACCESSORIES

HI 3850	
HI 3850-100	Spare reagent for 100 tests
HI 38074	
HI 38074-100	Spare reagent for 100 tests
HI 70004P	pH 4.01 buffer (25 sachets, 20 mL ea.)
HI 7004M	pH 4.01 buffer, 230 mL
HI 70007P	pH 7.01 buffer (25 sachets, 20 mL ea.)
HI 7007M	pH 7.01 buffer, 230 mL

Bromine, Calcium

HI 3830 Bromine (as Br₂)*

The HANNA portable bromine test kit determines the bromine level in water with efficiency. The first step involves pH adjustment of the sample to pH 6.3 by adding pH buffer. The second step consists of adding the second reagent, an indicator solution which contains DPD (N, N-diethyl-p-phenylenediamine). DPD is immediately oxidized by bromine producing a reddish color. The color intensity of the solution determines the bromine concentration.

HI 38086 Calcium Test Kit for Irrigation Water

The HI 38086 test kit determines calcium in irrigation water via a turbidimetric method. HANNA reagents react selectively with calcium to form a white suspension. The developed turbidity is proportional to calcium concentration.

HI 38080 Calcium and Magnesium Test Kit for Soil & HI 38081 Calcium and Magnesium Test Kit for Irrigation Water

The HI 38081 test kit determines calcium and magnesium in irrigation water via a titrimetric method. The HI 38080 test kit extracts calcium and magnesium from soil in acidic medium and then determines them via a titrimetric method. The indicator chelates with the calcium and magnesium ions to form a red colored complex. As EDTA is added, calcium and magnesium complex with it, and the reaction endpoint is indicated by a change in color of the indicator from red to blue.

ORDERING INFORMATION

HI 3830 test kit comes with 30 mL reagent 1, 20 mL reagent 2, color comparison cube, and plastic vessel.
HI 38086 test kit comes with 30 mL buffer reagent, oxalate reagent (100 packets), 500 mL deionized water, 50 mL glass test tube, 50 mL calibrated vessel, 1 mL plastic pipette, plastic spoon, graduated card and line card.

HI 38081 test kit comes with 30 mL Ca & Mg reagent, 120 mL EDTA solution (2), 10 mL calmagite indicator, demineralizer bottle for 12 L, 50 mL calibrated vessel, 1 mL plastic pipette, 3 mL plastic pipette and 1 mL syringe with tip.

HI 38080 test kit comes with 100 mL buffer solution, 10 mL calmagite solution, 120 mL EDTA solution, 50 mL calibrated vessel, 3 mL plastic pipette, 1 mL plastic pipette and 1 mL syringe with tip.

ACCESSORIES

HI 3830

HI 3830-060 Spare reagent for 60 tests
HI 38086

HI 38086-100 Spare reagent for 100 tests
HI 38081

HI 38081-100 Spare reagent for 100 tests
HI 38080

HI 3841-100 Spare reagents for 100 tests



HI 38081 Calcium and Magnesium Hardness

Bromine is less volatile and more stable than chlorine. This makes bromine a good choice as a disinfectant in pools as well as a sanitizing agent in drinking water systems. Like chlorine, excess amounts of bromine can be hazardous. Daily monitoring of bromine levels prevents adverse conditions and optimizes its proper function.

Calcium presence in water supplies results from passage over deposits of limestone, dolomite, gypsum and gypsiferous shale. Its concentration may extend from 0 to several hundred milligrams per liter, depending on its source and treatment. Calcium is necessary in plant and animal nutrition since it is an essential constituent of bones, shells and plant structures. Calcium in water as carbonate is one of the primary components of water hardness which can cause pipe or tube scaling.

Calcium and Magnesium are often present in soil as carbonates (e.g.: dolomite), sulfates (in arid regions) and silicates. They are necessary nutrients for plants since they have an important role in plant metabolism and growth. They can be removed from soil by leaching (for instance in acidic soil of humid regions) or by crop production; a deficiency of calcium and magnesium in soil will manifest itself in stunted growth and in yellow and deformed leaf tips. On the other hand, soil with an excess of calcium and magnesium will lock up other necessary micronutrients, making them unavailable to plant roots (e.g.: available phosphorus forms an insoluble salt with calcium at pH values above 7.5, thus decreasing the efficiency of applied phosphorus fertilizers).

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3830 Bromine (as Br₂)					
colorimetric	0.0-3.0 mg/L (ppm)	0.6 mg/L (ppm)	DPD	60 avg.	370 g
HI 38086 Calcium (Ca) of irrigation water					
turbidimetric	0-125 mg/L (ppm) 0-250 mg/L (ppm)	1 mg/L (ppm) 2 mg/L (ppm)	turbidimetric	100	950 g
HI 38081 Calcium (Ca) & Magnesium (Mg) Hardness of irrigation water					
titration	>0.0 meq/L	0.2 meq/L	EDTA	100 avg.	671 g
HI 38080 Calcium (Ca) & Magnesium (Mg) Hardness of soil					
titration	>0.0 meq/100 g	1.5 meq/100 g	EDTA	100 avg.	336 g

* No chlorine or iodine can be present in the water sample for this test to work properly.

Carbon Dioxide, Chloride Test for COD

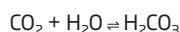


HI 3818 Carbon Dioxide



HI 3898 Chloride

Certain **carbon dioxide** levels are required in both man and nature's environment. Generally, lakes and rivers contain less than 10 mg/L carbon dioxide; however stagnant or polluted water can generate large amounts due to organic or mineral decomposition. These results can make the water corrosive and toxic to aquatic life-forms like fish. The monitoring of carbon dioxide levels is also critical in the man-made environment. A certain amount of carbon dioxide is reintroduced into potable water during the final stages of the water-softening process. In water systems, a delicate balance of carbon dioxide must be maintained to prevent either corrosion or encrustation of pipes and storage tanks.



CO_2 is toxic in higher concentrations and levels of even 1% (10,000 ppm) will make some people feel drowsy.

Carbon dioxide is used by food, oil, and chemical industries. It is used in many consumer products that require pressurized gas because it is inexpensive and nonflammable, and because it undergoes a phase transition from gas to liquid at room temperature.

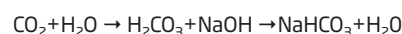
METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3818 Carbon Dioxide (as CO ₂)					
titration	0.0-10.0 mg/L (ppm)	0.1 mg/L (ppm)	phenolphthalein	110 avg.	460 g
	0.0-50.0 mg/L (ppm)	0.5 mg/L (ppm)			
	0-100 mg/L (ppm)	1 mg/L (ppm)			
HI 3898 Chloride (as Cl ⁻)*					
visual	1000 mg/L (ppm) (ISO) 2000 mg/L (ppm) (EPA)	-	silver nitrate	100	200 g

* If high chloride levels are detected, the sample for COD measurements needs to be diluted before digestion.

HI 3818 Carbon Dioxide (as CO_2) Test Kit

Carbon dioxide levels can be measured quickly and safely with the HANNA Carbon Dioxide Test Kit. This compact, portable kit allows the user the option of field or laboratory use. The design makes the kit easy to handle and, except for the Carbon Dioxide Reagent, practically prevents accidental injury or damage due to spills.

Carbon dioxide (as carbonic acid) in the water sample is neutralized with a dilute sodium-hydroxide solution to a pH of 8.3 using a phenolphthalein indicator. This process converts carbonic acid to sodium bicarbonate:



HI 3898 Chloride Rapid Screening Test for COD - ISO and EPA

This screening test is a quick test to detect high chloride levels in water and wastewater that might cause interference with official COD methods. The test is in accordance with the ISO 15705:2002 method, and indicates within seconds a YES/NO possibility of having chloride interference on COD measurements. The kit can be used for checking 1000 ppm chloride concentration for the ISO COD testing, or for a 2000 ppm chloride check for the USEPA, APHA, AWWA and WEF methods.

Upon adding the indicator to the sample, the solution turns yellow. Then the chloride titrant is added and a white precipitate is formed if chlorides are present. If the chloride concentration is lower than 1000 ppm for ISO, or 2000 ppm for EPA, an orange-brown complex is formed. If the solution remains yellow, high chloride concentrations are present.

ORDERING INFORMATION

HI 3818 test kit comes with 10 mL phenolphthalein indicator, 120 mL carbon dioxide reagent, 10 mL calibrated vessel, 50 mL calibrated vessel and calibrated syringe.

HI 3898 test kit comes with 25 mL chloride titrant bottles (4), 7 mL chloride indicator, glass cuvette with plastic stopper and 1.0 mL calibrated syringes with tips (2).

ACCESSORIES

HI 3818-100 Spare reagent for 100 tests

Chloride

HI 3815 Chloride Test Kit

The HANNA chloride test kit is quick, easy to use and portable. The design makes the kit easy to handle and, except for mercuric nitrate solution, practically prevents accidental injury or damage due to spills. The pH is lowered to approximately 3 by addition of nitric acid. Mercuric ions react with chloride ions to form mercuric chloride; when excess mercuric ions is present, it complexes with diphenylcarbazone to form a purple solution. The color change from yellow to purple determines the end point of this titration.

HI 38015 Chloride, Extended Range Test Kit

The HANNA extended range chloride test kit is equipped with all you need to determine high chloride levels of water. The chloride level in mg/L (ppm) is determined by a silver nitrate titration, using potassium chromate as indicator. The color change from yellow to brick-red determines the end point of this titration.

ORDERING INFORMATION

HI 3815 test kit comes with 15 mL diphenylcarbazone indicator, 30 mL nitric acid solution, 120 mL mercuric nitrate solution, 50 mL calibrated vessel, 10 mL calibrated vessel, calibrated syringe with tip.

HI 38015 test kit comes with 100 mL chloride reagent A, 25 mL chloride reagent B (2), 100 mL chloride reagent C, demineralizer bottle with filter cap for 12 L, 50 mL calibrated plastic vessel with cap, 3 mL plastic pipette, 1 mL plastic pipette, 1 mL syringes with tips (2) and brush.

ACCESSORIES

HI 3815

HI 3815-100 Spare reagent for 100 tests

HI 38015

HI 3815-100 Spare reagent for 100 tests



HI 3815 Chloride

Chloride ions are one of the major inorganic anions in water and wastewater.

Effects on humans

A normal adult human body contains approximately 81.7 g chloride. On the basis of a total obligatory loss of chloride of approximately 530 mg/day, a dietary intake of 9 mg of chloride per kg of body weight for adults has been recommended (equivalent to slightly more than 1 g of table salt per person per day).

Chloride toxicity has not been observed in humans except in the special case of impaired sodium chloride metabolism, e.g. in congestive heart failure. Healthy individuals can tolerate the intake of large quantities of chloride provided that there is a accompanying intake of fresh water. Little is known about the effect of prolonged intake of large amounts of chloride in the diet. As shown with experimental animals, hypertension associated with sodium chloride intake appears to be related to the sodium rather than the chloride ion.

Other considerations

Chloride increases the electrical conductivity of water and thus increases its corrosivity. In metal pipes, chloride reacts with metal ions to form soluble salts, thus increasing levels of metals in drinking-water. In lead pipes, a protective oxide layer is built up, but chloride enhances galvanic corrosion. It can also increase the rate of pitting corrosion of metal pipes.

Chloride concentrations in excess of about 250 mg/L can be detected by taste in water, but the threshold depends upon the associated cations. Consumers can, however, become accustomed to concentrations in excess of 250 mg/L.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3815 Chloride (as Cl⁻)					
titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	1 mg/L (ppm) 10 mg/L (ppm)	mercuric nitrate	110 avg.	460 g
HI 38015 Chloride (as Cl⁻)					
titration	500-10000 mg/L (ppm) 5000-100000 mg/L (ppm)	100 mg/L (ppm) 1000 mg/L (ppm)	silver nitrate	100	664 g



HI 38017 Free & Total Chlorine

Free chlorine reacts with ammonium ions and organic compounds to form chlorine compounds resulting in diminished disinfecting capabilities compared with free chlorine. These chlorine compounds together with chloramines form combined chlorine. Combined chlorine and excess free chlorine together result in total chlorine. While free chlorine has a much higher disinfectant potential, combined chlorine has a much higher stability and has a lesser volatility. There should be sufficient levels of unreacted free chlorine for adequate disinfection, but not so much as to become harmful.

CODE	METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
Chlorine (as Cl₂) Free						
HI 3829F	colorimetric	0.0-2.0 mg/L (ppm)	0.5 mg/L (ppm)	DPD	50 avg.	176 g
HI 3831F*	colorimetric	0.0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	DPD	50 avg.	176 g
HI 3875	checker disc	0.0-3.5 mg/L (ppm)	0.1 mg/L (ppm)	DPD	100	984 g
HI 38018	checker disc	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm)	0.02 mg/L (ppm) 0.1 mg/L (ppm)	DPD	200	647 g
Chlorine (as Cl₂) Free & pH						
HI 3887	colorimetric	Cl ₂ : 0.0-2.5 mg/L (ppm) pH: 6.0-8.5 pH	Cl ₂ : 0.5 mg/L (ppm) pH: 0.5 pH	DPD pH indicator	50 avg. 100	280 g
Chlorine (as Cl₂) Free & Total						
HI 38017	checker disc	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm)	0.02 mg/L (ppm) 0.1 mg/L (ppm)	DPD	200	696 g
HI 38020	checker disc	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm) 0.0-10.0 mg/L (ppm)	0.02 mg/L (ppm) 0.1 mg/L (ppm) 0.5 mg/L (ppm)	DPD	200	688 g

*HI 3831F/S for Spain

HI 3829F Free Chlorine Test Kit
With color cube

HI 3831F Free Chlorine Test Kit

HI 3875 Free Chlorine Test Kit
Medium Range with Checker Disc

HI 38018 Free Chlorine Test Kit
Low and Medium Range with Checker Disc

HI 3887 Free Chlorine and pH Test Kit
With Checker Disc

HI 38017 Free & Total Chlorine Test Kit
Low and Medium Range with Checker Disc

HI 38020 Free & Total Chlorine Test Kit
Low, Medium and High Range with Checker Disc

ORDERING INFORMATION

HI 3829F test kit comes with color comparison cube, 20 mL reagent 1 and 15 mL reagent 2

HI 3831F and HI 3831F/S test kit comes with color comparison cube, 20 mL reagent 1 and 15 mL reagent 2.

HI 3831T/S test kit comes with

HI 3875 test kit comes with HI 93701-0 free Cl reagent (100 packets), 500 mL deionized water, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

HI 38018 test kit comes with HI 93701-0 free chlorine reagent (200 packets), demineralizer bottle with cap for 12 L, checker disc, glass vials with caps (2) and 3 mL plastic pipettes.

HI 3887 test kit comes with color comparison cubes (2), 20 mL reagent 1, 15 mL reagent 2, 25 mL HI 3881-0 pH 6.0-8.5 reagent

HI 39017 and HI 38020 test kits come with HI 93701-0 free chlorine reagent (100 packets), HI 93711-0 total chlorine reagent (100 packets), demineralizer bottle with filter cap for 12 L, checker disc, glass vials with caps (2) and 3 mL plastic pipettes

ACCESSORIES

HI 3829F

HI 3829F-050 Spare reagent for 50 tests

HI 3831F and HI 3831F/S

HI 3831F-050 Spare reagent for 50 tests

HI 3875

HI 3875-100 Spare reagent for 100 tests

HI 38018

HI 38018-200 Spare reagent for 200 tests

HI 93701-01 Spare reagent for 100 tests

HI 90701-03 Spare reagent for 300 tests

HI 740231 20 mL glass cylinders with caps

DEMI-10

Demineralizer bottle

HI 3887

HI 3831F-050 Spare reagent for 50 tests (Free Cl)

HI 3881-100 Spare reagent for 100 tests (pH)

HI 3881-010 Spare reagent for 100 tests (pH) + Reagent

HI 38017

HI 38017-200 Spare reagent for 200 tests (100 tests Free Cl, 100 tests Total Cl)

HI 93701-01 Spare reagent for 100 tests - Free Cl

HI 93701-03 Spare reagent for 300 tests - Free Cl

HI 93711-01 Spare reagent for 100 tests - Total Cl

HI 93711-03 Spare reagent for 300 tests - Total Cl

HI 740231 20 mL glass cylinders with caps

DEMI-10

Demineralizer Bottle

HI 38020

HI 38020-200 Spare reagent for 200 tests (100 tests Free Cl + 100 tests Total Cl)

Chemical Test Kits

Chlorine, Total

HI 3831T Total Chlorine Test Kit
(HI3831T/S - for Spain)

HI 38016 Total Chlorine Test Kit
Medium range with checker disc

HI 38019 Total Chlorine Test Kit
Low and medium range with checker disc

HI 38022 Total Chlorine Test Kit
High Range Test Kit

HI 38023 Total Chlorine Test Kit
Extended range

HI 3888 Total Chlorine & pH Test Kit
With color comparison cube

ORDERING INFORMATION

HI 3831T and **HI 3831T/S** test kits comes with color comparison cube, 20 mL chlorine reagent 1, 15 mL chlorine reagent 2 and 15 mL chlorine reagent 3

HI 38016 test kit comes with HI 90711-0 total Cl reagent (100 packets), 500 mL deionized water, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

HI 38019 test kit comes with HI 93711-0 total Cl reagent (100 packets), demineralizer bottle with filter cap for 12 L, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

HI 38022 test kit comes with 30 mL potassium iodide solution, sulfamic reagent (100 packets), 25 mL starch indicator, 100 mL thiosulfate reagent, 50 mL calibrated vessel, 20 mL calibrated vessel, 3 mL plastic pipette, 1 mL plastic pipette and spoon.

HI 38023 test kit comes with 30 mL potassium iodide solution, sulfamic reagent (100 packets), 25 mL starch indicator, 100 mL thiosulfate reagent, 50 mL calibrated vessel, 1 mL syringe with tip, 1 mL plastic pipette and spoon.

HI 3888 test kit comes with color comparison cube, 20 mL Cl reagent 1, 15 mL Cl reagent 2, 15 mL Cl reagent 3 and 25 mL HI 3881-0 pH 6.0-8.5 reagent.

ACCESSORIES

HI 3831T and **HI 3831T/S**

HI 3881T-050 Spare reagent for 50 tests
HI 38016

HI 38016-100 Spare reagent for 100 tests
HI 38019

HI 38019-200 Spare reagent for 200 tests
HI 38022

HI 38022-100 Spare reagent for 100 tests
HI 38023

HI 38023-100 Spare reagent for 100 tests
HI 3888

HI 3831T-050 Spare reagent for 50 tests (total Cl)

HI 3881-100 Spare reagent for 100 tests (pH)

HI 3881-010 Spare reagent for 100 tests (pH) + dechlorinating reagent



HI 3831F and 3831T Chlorine



HI 38022 Total Chlorine

The chlorination of water supplies and polluted waters is used mainly to destroy or deactivate disease-producing micro-organisms. It also serves to improve the quality of drinking waters, as chlorine reacts with ammonia, iron, manganese, sulfide and some organic substances.

Nevertheless, high amounts of **chlorine** will produce adverse effects, like formation of compounds which are potentially carcinogenic (e.g. chloroform) or harmful to aquatic life (e.g. chloramines). Thus it is essential to control that the proper amount of chlorine has been added in order to fulfill the primary purpose of disinfecting and to minimize any adverse effects.

CODE	METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
Chlorine (as Cl₂) Total						
HI 3831T*	colorimetric	0.0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	DPD	50	205 g
HI 38016	checker disc	0.0-3.5 mg/L (ppm)	0.1 mg/L (ppm)	DPD	100	977 g
HI 38019	checker disc	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm)	0.02 mg/L (ppm) 0.1 mg/L (ppm)	DPD	200	678 g
HI 38022	titration	0.0-4.0 mg/L (ppm) 0.0-20.0 mg/L (ppm)	0.2 mg/L (ppm) 1.0 mg/L (ppm)	iodometric	100	561 g
HI 38023	titration	10-200 mg/L (ppm)	10 mg/L (ppm)	iodometric	100	547 g
Chlorine (as Cl₂) Total & pH						
HI 3888	colorimetric	Cl ₂ : 0.0-2.5 mg/L (ppm) pH: 6.0-8.5 pH	Cl ₂ : 0.5 mg/L (ppm) pH: 0.5 pH	DPD pH indicator	50 100	310 g

*HI 3831T/S for Spain



HI 3845 Chromium

Chromium is a metallic element in the periodic table. It is odorless and tasteless. Chromium is found naturally in rocks, plants, soil and volcanic dust, humans and animals. The most common forms of chromium in the environment are trivalent (chromium III), hexavalent (chromium VI) and the metal form, chromium 0. Chromium III occurs naturally in many vegetables, fruits, meats, grains and yeast. Chromium VI and 0 are generally produced by industrial processes. Major sources of chromium VI in drinking water are discharges from steel and pulp mills, and erosion of natural deposits of chromium III. At many locations, chromium compounds have been released to the environment via leakage, poor storage, or improper disposal practices. Chromium compounds are very persistent in water as sediments. The current maximum contaminant level for chromium in all forms in drinking water is 100 µg/L, which includes chromium VI.

Toxicologic Information

Hexavalent chromium is transported into cells via the sulfate transport mechanisms, taking advantage of the similarity of sulfate and chromate with respect to their structure and charge. Trivalent chromium, which is the more common variety of chromium compounds, is not transported into cells. Inside the cell, chromium VI is reduced first to metastable chromium V, then to trivalent chromium. Chromate-dyed textiles or chromate-tanned leather shoes can cause or exacerbate contact dermatitis. Vitamin C and other reducing agents combine with chromate to give chromium III products inside the cell. Hexavalent chromium compounds are genotoxic carcinogens. Chronic inhalation of hexavalent chromium compounds increases risk of lung cancer (lungs are especially vulnerable, followed by fine capillaries in kidneys and the intestine). According to some researchers, the damage is caused by hydroxyl radicals, produced during reoxidation of pentavalent chromium by hydrogen peroxide molecules present in the cell. In the U.S., the OSHA PEL for airborne exposures to hexavalent chromium is 5 µg/m³ (0.005 mg/m³).

Chromium salts are widely used in industrial processes, such as metal finishing and plating industries, as well as in the leather industry as a tanning agent, and in the manufacture of paints, dyes, explosives and ceramics. Chromium may enter a water supply through the discharge of waste from these industries and may also be discharged from chromate-treated cooling waters, where they are frequently added for corrosion control. The hexavalent state of chromium is toxic to humans, animals and aquatic life. It can also produce lung tumors when inhaled and readily induces skin sensitization.

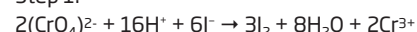
METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3845 Chromium (as Cr ⁶⁺)					
titration	0-100 mg/L (ppm) 100-1000 mg/L (ppm)	5 mg/L (ppm) 50 mg/L (ppm)	iodometric	100 avg.	416 g
HI 3846 Chromium (as Cr ⁶⁺)					
colorimetric	0.0-1.0 mg/L (ppm)	0.2 mg/L (ppm)	diphenylcarbohydrazide	100 avg.	160 g

HI 3845 Chromium Medium Range and High Range Test Kit

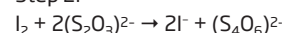
The HANNA chromium test kit is field portable and can also be used in the laboratory. HI 3845 is able to determine traces of chromium up to 1000 ppm.

Chromate is determined by a titrimetric method. Only the hexavalent chromium will react with iodide in acid solution. (Step 1:) The amount of iodine generated is equivalent to the chromium in the sample. (Step 2:) The liberated iodine is then titrated with standard sodium thiosulfate solution that reduces the iodine back to iodide ions.

Step 1:



Step 2:



HI 3846 Chromium Test Kit

Chromium VI reacts with diphenylcarbohydrazide to form a purple product in an acidic buffered condition. The amount of color developed is proportional to the concentration of chromium present in the aqueous sample.



HI 3846 Chromium

ORDERING INFORMATION

HI 3845 test kit comes with chromium MR-HR reagent A (100 packets), 17 g chromium MR-HR reagent B, 60 mL chromium MR-HR reagent C, 25 mL starch indicator, 20 mL calibrated vessel, 1 mL plastic pipette, graduated plastic test tube with cap.

HI 3846 test kit comes with HI 3846-O reagent (100 packets) and color comparison cube.

ACCESSORIES

HI 3845

HI 3845-100 Spare reagent for 100 tests

HI 3846

HI 3846-100 Spare reagent for 100 tests

Copper

HI 3847 Copper Test Kit

Copper is an essential trace element in human diet (the daily requirement is around 2.0 mg) and a factor in plant metabolism.

On the other hand, corrosion of copper alloys in pipe fittings may introduce considerable quantities of copper into water supplies.

Copper salts react with bichinchonate reagent to form a purple product in a neutral buffered condition. The amount of color developed is directly proportional to the concentration of copper present in the aqueous sample.

HI 3856 Copper Test

Ultra low range, with color comparison cube.

HI 38075 Copper Test Kit

Low and high range, with long path and normal color comparison cubes.



HI 38075 Copper

ORDERING INFORMATION

HI 3847 test kit comes with HI 3847-0 reagent (100 packets) and color comparison cube.

HI 3856 test kit comes with HI 3856-0 reagent (100 packets) and color comparison cube.

HI 38075 test kit comes with HI 93702-0 reagent (50 packets), HI 3856-0 reagent (50 packets), 230 mL deionized water, long path color comparison cube, color comparison cube, 14 mL plastic test tube with screw cap, 3 mL plastic pipette.

ACCESSORIES

HI 3847

HI 3847-100 Spare reagent for 100 tests

HI 3856

HI 3856-100 Spare reagent for 100 tests

HI 38075

HI 38075-100 Spare reagent for 100 tests (50 LR and 50 HR)



HI 3856 Copper

Copper is a reddish metal that occurs naturally in rock, soil, water, sediment, and air. Its unique chemical and physical properties have made it one of the most commercially important metals. Since copper is easily shaped or molded, it is commonly used to make money, electrical wiring, and water pipes. Copper compounds are also used as an agricultural pesticide and to control algae in lakes and reservoirs.

Copper is found in surface water, groundwater, seawater and drinking water, in complexes or as particulate matter. Copper concentrations in drinking water vary widely as a result of variations in water characteristics, such as pH, hardness and copper availability in the distribution system.

Copper concentrations in drinking water often increase during distribution, especially in systems with an acid pH or high-carbonate waters with an alkaline pH (US EPA, 1995). In the USA, first-draw copper concentrations must be reported to the US EPA if they exceed 1.3 mg/L.

Elevated copper levels in drinking water may cause adverse health effects; a metallic taste in drinking water indicates that copper levels may have reached that level. Also, high concentrations of copper are correlated with blue or blue-green stains around sinks and plumbing fixtures. The only way to be certain of the copper level in your drinking water supply is to have the water tested.

If you are being served by a public water system, the owner of the utility will have results of copper sampling which has been done in parts of the distribution system. If the EPA action level of 1300 µg/L for copper is exceeded in more than 10% of samples collected, the utility must conduct further testing to determine if the corrosiveness of the water is contributing to an increase in the copper levels.

They are also required to optimize corrosion control measures to reduce the corrosion of the water to acceptable levels. If you have questions regarding copper monitoring, contact your water utility.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3847 Copper					
colorimetric	0.0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	bichinchonic acid	100	150 g
HI 3856 Copper					
colorimetric	0.00-0.25 mg/L (ppm)	0.05 mg/L (ppm)	bichinchonic acid	100	180 g
HI 38075 Copper					
colorimetric	0.00-0.25 mg/L (ppm) 0.0-6.0 mg/L (ppm)	0.05 mg/L (ppm) 1.2 mg/L (ppm)	bichinchonic acid	100	555 g

Cyanide, Cyanuric Acid

1

HANNA CHECKER®HC SERIES AND CHEMICAL TEST KITS



HI 3855 Cyanide

Cyanides can both occur naturally or be man-made and many are powerful and fast-acting poisons. Hydrogen cyanide (HCN), which is a gas, and the simple cyanide salts (sodium cyanide and potassium cyanide) are common examples of cyanide compounds. Certain bacteria, fungi, and algae can produce cyanide, and cyanide is found in a number of foods and plants. In certain plant foods, including almonds, millet sprouts, lima beans, soy, spinach, bamboo shoots, and cassava roots (which are a major source of food in tropical countries), cyanides occur naturally as part of sugars or other naturally-occurring compounds.

Many of the cyanides in soil and water come from industrial processes. The major sources of cyanides in water are discharges from some metal mining processes, organic chemical industries, iron and steel plants or manufacturers, and publicly owned wastewater treatment facilities. Other cyanide sources include vehicle exhaust, releases from certain chemical industries, burning of municipal waste, and use of cyanide-containing pesticides. Much smaller amounts of cyanide may enter water through storm water runoff where road salts are used that contains cyanide.

Cyanide in landfills can contaminate underground water. Hydrogen cyanide, sodium cyanide, and potassium cyanide are the forms of cyanide most likely to be in the environment as a result of industrial activities. Hydrogen cyanide is a colorless gas with a faint, bitter, almond-like odor.

Cyanuric acid is marketed as a chlorine stabilizer for swimming pools. It forms a weak bond with free chlorine in the pool water, protecting it from the sun's ultraviolet rays to reduce chlorine loss. Properly managed, cyanuric acid has been shown to reduce the amount of chlorine needed to maintain the minimum chlorine residual in an outdoor pool. In a small pool with a moderate bather load, cyanuric acid can significantly reduce the cost for chemical disinfection. The recommended range for cyanuric acid is 30-80 ppm.

HI 3855 Cyanide Test Kit

Cyanide refers to all of the CN groups in cyanide-compounds that can be determined as the cyanide ion CN^- . In most natural waters the molecular HCN form predominates. In solutions of metal cyanides, the CN group may also be present as a complex of varying stability. Cyanides are extensively used for extraction of silver/gold ores, metal-cleaning and electroplating baths, coke ovens and other chemical processes. There are mainly two chemical treatments to remove cyanides from waste-waters: one is chlorination and the other is the alkaline method.

Cyanides react with the pyridine-pyrazolone reagent to form a blue complex in neutral buffered solution. The absorbance of this colored product is proportional to the concentration of cyanide present in the aqueous sample.

HI 3851 Cyanuric Acid Test Kit

Cyanuric acid (CYA) is widely applied in swimming pools to slow down the decomposition of chlorine. In outside pool areas, this process is accelerated by the effect of ultraviolet rays. With a correct dose, it can save up to 80% of normal chlorine consumption in pools during peak sunny months.

Cyanuric acid is also used in chlorinated bleaches and selective herbicides.

The reaction between cyanuric acid and the reagent causes a white suspension in the sample. The turbidity is proportional to the concentration of cyanuric acid.

ORDERING INFORMATION

HI 3855 test kit comes with 17 g cyanide reagent A, 100 packets cyanide reagent B, 100 packets cyanide reagent C, checker disc, glass vials with caps, 3 mL plastic pipette and spoon.

HI 3851 test kit comes with 100 packets HI 93722-0 reagent, 25 mL glass test tube, 50 mL plastic vessel, 3 mL plastic pipette and spoon.

ACCESSORIES

HI 3855

HI 3855-100 Spare reagent for 100 tests

HI 3851

HI 3851-100 Spare reagent for 100 tests

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3855 Cyanide (as CN^-)					
checker disc	0.00-0.30 mg/L (ppm)	0.01 mg/L (ppm)	pyridine-pyrazolone	100	580 g
HI 3851 Cyanuric Acid					
turbidimetric	10-100 mg/L (ppm)	5 mg/L (ppm)	turbidimetric	100	195 g

Detergents, Formaldehyde, Glycol

HI 3857 Detergents Test Kit

The aqueous solution containing the detergents is treated with the colored indicator. The reaction product can be extracted in the chloroform layer, while the original dyestuff is insoluble in the organic medium. The intensity of the color developed is proportional to the concentration of the detergents present.

HI 3838 Formaldehyde Test Kit

The HANNA formaldehyde portable test kit makes monitoring easy, quick and safe. The design of the kit makes it practically impossible to spill the reagents, thereby reducing the possibility of injury or damage to property.

Formaldehyde concentration is determined by a simple acid titration. The formaldehyde, in the aqueous sample, reacts with sodium sulfite to form an alkaline product. This product is then titrated to a yellow alizarin R yellow endpoint, using a prestandardized hydrochloric acid solution.

HI 3859 Glycol Yes/No Test Kit

Use the HI 3859 glycol standard 0.025% included in the kit to easily recognize a positive result in the form of an intense purple color. Ethylene glycol and other glycols are determined by a two step reaction:

Step 1: glycol is oxidized to two carbonyl groups under acidic conditions;

Step 2: the carbonyl groups react with the indicator to give a colored solution.

ORDERING INFORMATION

HI 3857 test kit comes with 15 mL detergents reagent A, 15 mL detergent reagent B, 180 mL chloroform, demineralizer bottle with filter cap for 12 L, checker disc, 30 mL long glass vials with caps (2), long plastic pipette, 3 mL plastic pipette and 1 mL plastic pipette.

HI 3838 test kit comes with 15 mL Alizarin Yellow R indicator, 30 g sodium sulfite, 120 mL titrant solution, plastic spoon, plastic bottle, 10 mL calibrated vessel, filter cartridge, calibrated titration syringe and plungers

HI 3859 test kit comes with 125 mL glycol reagent A, 25 packets glycol reagent B, 25 packets glycol reagent C, 25 mL glycol standard 0.025%, 3 mL plastic pipette, 1 mL plastic pipettes (25), 10 mL glass vials with caps (2) and brush.

ACCESSORIES

HI 3857

HI 3857-035 Spare reagent for 35 tests

HI 3838

HI 3838-100 Spare reagent for 100 tests

HI 3859

HI 3859-025 Spare reagent for 25 tests



HI 3859 Glycol Yes/No Test Kit

Detergents can enter water and wastewater by discharge of domestic and industrial cleansing waters. The most widely used detergents are linear alkyl sulfonates (LAS) and alkyl benzene sulfonates (ABS): LAS are preferable to ABS because they are biodegradable, thus readily decomposed by microorganisms. The presence of anionic LAS/ABS detergents in natural waters should be below 0.1 mg/L and in raw domestic wastewater in the range from 1 to 20 mg/L.

Formaldehyde is used widely in industry. Its duties vary from holding dyes onto fabrics, to assisting in the electroplating of metals. Each application uses different levels of formaldehyde and requires monitoring to optimize its given purpose.

Ethylene **glycol** is widely used as a coolant and antifreeze. Its presence in motor oils is an indication of a perforated engine block or of a leakage in the cooling systems. The HANNA glycol test kit can be used for water as well as oil samples to determine traces of ethylene glycol and other 1,2 glycols above 30 ppm. For better results test samples from used motor oil since samples from new oils can give erroneous positive results. Never test oils from hot engines.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3857 Detergents					
checker disc	0.00-1.30 mg/L (ppm)	0.02 mg/L (ppm)	methylene blue	35	1245 g
HI 3838 Formaldehyde (as CH₂O)					
titration	0.00-1.00% 0.0-10.0%	0.01% 0.1%	sodium sulfite/ hydrochloric acid	110 avg.	910 g
HI 3859 Glycol					
visual	Present/Absent	–	oxidation of glycolic group	25	380 g

**HI 3812 Total Hardness**

Water **hardness** has traditionally been defined as the capacity of water to precipitate soap. The ionic species in the water causing the precipitation was later found to be primarily calcium and magnesium. In the present, therefore, water hardness is actually a quantitative measure of these ions in the water sample. It is also now known that certain other ion species, such as iron, zinc and manganese, contribute to the overall water hardness. The measure and subsequent control of water hardness is essential to prevent scaling and clogging in water pipes.

METHOD	RANGE*	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3812 Hardness (as CaCO₃) Total					
titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	0.3 mg/L (ppm) 3 mg/L (ppm)	EDTA	100	460 g
HI 3840 Hardness (as CaCO₃) Total					
titration	0-150 mg/L (ppm)	5 mg/L (ppm)	EDTA	50 avg.	120 g
HI 3841 Hardness (as CaCO₃) Total					
titration	40-500 mg/L (ppm)	20 mg/L (ppm)	EDTA	50 avg.	120 g
HI 3842 Hardness (as CaCO₃) Total					
titration	400-3000 mg/L (ppm)	100 mg/L (ppm)	EDTA	50 avg.	120 g
HI 38033 Hardness (as CaCO₃) Total					
titration	0-30 gpg	1 gpg	EDTA	100	457 g
HI 38034 Hardness (as CaCO₃) Total					
titration	0.0-20.0 gpg 0.0-20.0 mg/L (ppm)	0.2 gpg 0.2 mg/L (ppm)	EDTA EDTA	200	567 g
HI 38035 Hardness (as CaCO₃) Total & Calcium					
titration	Total: 0.0-20.0 gpg Ca: 0.0-20.0 gpg	0.2 gpg 0.2 gpg	EDTA EDTA	200	960 g

* 1 gpg = 17 ppm CaCO₃**HI 3812 Hardness Test Kit**

The hardness level as mg/L (ppm) calcium carbonate is determined by an EDTA (ethylene-diamine-tetraacetic acid) titration.

HI 3840 Hardness Low Range Test Kit

The HANNA Test Kit determines total hardness in water via a titrimetric method.

HI 3841 Hardness Test Kit

Medium Range

HI 3842 Hardness Test Kit

High Range

HI 38033 Total Hardness Test Kit

0-30 gpg range

HI 38034 Total Hardness Test Kit

0-20 gpg range, 0-20 ppm range

HI 38035 Total Hardness & Calcium Test Kit

Calcium concentration is determined by an EDTA titration.

ORDERING INFORMATION

HI 3812 test kit comes with 30 mL hardness buffer, 10 mL calmagite indicator, 120 mL EDTA solution, 20 mL plastic beaker with cap, 50 mL plastic beaker with cap and 1 mL syringe with tip

HI 3840 test kit comes with 30 mL hardness LR reagent and 50 mL calibrated vessel.

HI 3841 test kit comes with 30 mL hardness MR reagent and 50 mL calibrated vessel.

HI 3842 test kit comes with 30 mL hardness HR reagent and 50 mL calibrated vessel.

HI 38033 test kit comes with 30 mL buffer solution, 10 mL calmagite indicator, 75 mL EDTA solution (2), 20 mL plastic beaker with cap and 1 mL plastic pipette.

HI 38034 test kit comes with 30 mL buffer solution (2), 10 mL calmagite indicator, 100 mL EDTA solution (0-20 gpg), 100 mL EDTA solution (0-20 ppm), 50 mL calibrated vessel with cap and 1 mL syringes (2).

HI 38035 test kit comes with 30 mL buffer solution, 10 mL calmagite indicator, 100 mL EDTA solution (0-20 gpg), 10 mL calcium reagent A, 10 mL calcium reagent B, 15 mL calcium solution B, 100 mL calcium solution D, 50 mL calibrated plastic vessel with cap and 1 mL syringe with two tips.

ACCESSORIES**HI 3812**

- HI 3812-100** Spare reagent for 100 tests
- HI 740032P** Cap for 20 mL plastic beaker (10)
- HI 740034P** Cap for 50 mL plastic beaker (10)
- HI 740036P** 50 mL plastic beaker (10)
- HI 740037P** 20 mL plastic beaker (10)
- HI 740142P** 1 mL graduated syringe (10)
- HI 740144P** Tips for 1 mL graduated syringe (10)

HI 38033

- HI 38033-100** Spare reagent for 100 tests
- HI 740032P** Cap for 20 mL plastic beaker (10)
- HI 740037P** 20 mL plastic beaker (10)

HI 38034

- HI 38034-200** Spare reagent for 200 tests
- HI 38035**
- HI 38035-200** Spare reagent for 200 tests

Hydrazine, Hydrogen Peroxide, Hydroxide

HI 3849 Hydrazine Test Kit

Hydrazine reacts with the reagent in acidic solution to form a yellow complex. The absorbance of this colored product is proportional to the concentration of hydrazine present in the aqueous sample.

HI 3844 Hydrogen Peroxide Test Kit

The HANNA test kit can quickly and easily determine concentration in water up to 10 ppm of hydrogen peroxide. This is due to the fact that it is not affected by stabilizers, which are sometimes added to commercial hydrogen peroxide solutions. The kit is portable and can be used in the field as well as in the laboratory.

Hydrogen peroxide is determined by a titrimetric method. It reacts slowly with iodide in acid solution (**Step 1**); thus a 15 minute interval is required to allow the reaction to occur completely. The amount of iodine generated is equivalent to the hydrogen peroxide in the sample. The liberated iodine is then titrated with standard sodium thiosulfate solution that reduces the iodine back to iodide ions (**Step 2**).

HI 3839 Hydroxide Test Kit

The portable hydroxide test kit measures hydroxide levels using a fast and easy titrimetric method. The hydroxide ion concentration is determined by a titration. The hydroxide ions react with hydrochloric acid, until an endpoint is reached, where all the hydroxide ions have reacted. The addition of phenolphthalein determines this endpoint, by changing from pink to a colorless solution.

ORDERING INFORMATION

HI 3849 test kit comes with 50 mL hydrazine reagent (2), 500 mL deionized water, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

HI 3844 test kit comes with 100 mL hydrogen peroxide reagent A, 17 g hydrogen peroxide reagent B, 30 mL hydrogen peroxide reagent C, 25 mL hydrogen peroxide reagent D, graduated plastic test tube with cap, 50 mL calibrated plastic vessel, 3 mL plastic pipette, 1 mL plastic pipette and plastic spoon.

HI 3839 test kit comes with 20 mL calibrated vessel, 50 mL calibrated vessel, 10 mL phenolphthalein indicator, 120 mL titrant solution and calibrated syringe with tip.

ACCESSORIES

HI 3849

HI 3849-100 Spare reagent for 100 tests

HI 3844

HI 3844-100 Spare reagent for 100 tests

HI 3839

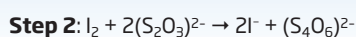
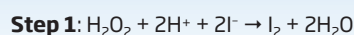
HI 3839-100 Spare reagent for 100 tests



HI 3849 Hydrazine

Hydrazine is an artificial chemical and it is not found in natural waters. It is extensively used as an oxygen scavenger to inhibit corrosion in high pressure boiler feedwater and reactor cooling water: this reducing chemical reacts with dissolved oxygen to yield nitrogen and water, so that hydrazine has the advantage over the sulfite treatment because it does not produce any dissolved solids in the boiler water.

Hydrogen peroxide is widely used as a disinfectant and as bleach for textiles, wood pulp, hair, fur etc. It is also used as a substitute for chlorine in water and sewage treatment. Most common commercial forms are aqueous solutions containing about 6, 12 and 30 per cent hydrogen peroxide and are referred to as "20-volume", "40-volume" and "100-volume" respectively, meaning the value of oxygen liberated when the solution is boiled.



In electrolytic copper plating, an alkaline solution is required in the bath. The process involves **hydroxide** ions reacting with formaldehyde to form hydride ions. These ions then reduce copper. The monitoring of hydroxide concentration in the bath is essential to optimize the performance of the bath.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3849 Hydrazine (as N₂H₄)					
checker disc	0.00-1.00 mg/L (ppm)	0.02 mg/L (ppm)	p-dimethylamino-benzaldehyde	100	860 g
HI 3844 Hydrogen Peroxide (as H₂O₂)					
titration	0.00-2.00 mg/L 0.0-10.0 mg/L	0.25 mg/L (ppm) 1.0 mg/L (ppm)	iodometric	100 avg.	450 g
HI 3839 Hydroxide (as OH⁻)					
titration	0.00-1.00 g/L (ppt) 0.0-10.0 g/L (ppt)	0.01 g/L (ppt) 0.1 g/L (ppt)	phenolphthalein	110 avg.	460 g

Hypochlorite, Iodine



HI 3832 Iodine

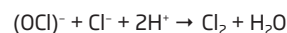
Hypochlorites are common bleaching agents to whiten textile or paper and to disinfect solutions. Sodium hypochlorite solution has been traditionally used for the treatment of pool water, since it is an inexpensive and readily available form of chlorine. The solution usually contains 10 to 15% available chlorine (equivalent to 100 to 150 g/L), but it rapidly loses its strength during storage. In addition, since it is greatly affected by heat, light, pH and heavy metals and needs to be monitored regularly.

Iodine may be used as a disinfectant in drinking and swimming pool waters. Unlike chlorinated pools, water treated with iodine decrease eye irritation among swimmers and provides a disinfectant more stable to adverse conditions. However, iodine levels in the water must be frequently checked to maximize its given purpose.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3843 Hypochlorite (as Cl₂)					
titration	50-150 g/L (ppt)	5 g/L (ppt) (0.5%)	iodometric	100 avg.	485 g
HI 3832 Iodine (as I₂)					
colorimetric	0.0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	DPD	50 avg.	180 g
HI 3879 Iodine (as I₂)					
colorimetric	0-5 mg/L (ppm)	1 mg/L (ppm)	DPD	100	143 g

HI 3843 Bleach Test Kit

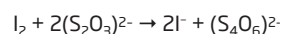
The available chlorine refers to the chlorine liberated by the action of dilute acid on the hypochlorite:



An iodometric titration method is used in this test kit. The hypochlorite solution is treated with potassium iodide and strongly acidified with acid:



The amount of iodine generated is equivalent to the chlorine in the sample. The concentration of iodine is then calculated by titration of thiosulfate ions that reduce the iodine back to iodide ions:



HI 3832 Iodine Test Kit

The HI 3832 iodine test kit employs a color cube to determine the iodine content in water. The kit is compact and is practical for field use. No chlorine or bromine can be present in the water sample for this test to work properly. The iodine is measured by a colorimetric method. The sample is initially treated with a phosphate buffer to a pH of approximately 6.3. The addition of DPD (N, N-diethyl-p-phenylenediamine) is immediately oxidized by iodine producing a reddish color. The color intensity of the solution determines the iodine concentration.

HI 3879 Iodine Test Kit

The HI 3879 HANNA iodine test kit employs a color cube to determine the iodine content in water.

ORDERING INFORMATION

HI 3843 test kit comes with 30 mL potassium iodide solution, 100 packets bleach reagent B, 60 mL bleach reagent C (2), 125 mL glass Erlenmeyer flask and 1 mL plastic pipettes (25).

HI 3832 test kit comes with color comparison cube, 30 mL reagent 1 and 20 mL reagent 2

HI 3879 test kit comes with 100 packets iodine reagent, color comparison cube and 2 mL plastic pipette.

ACCESSORIES

HI 3843

HI 3843-100 Spare reagent for 100 tests

HI 3832

HI 3832-050 Spare reagent for 50 tests

HI 3879

HI 3879-100 Spare reagent for 100 tests

Iron

HI 3834 Iron Test Kit

The HANNA test kit determines the iron concentration in water by conversion of the ferrous (Fe^{2+}) state. The test is fast, easy and safe. The color cube makes it simple to obtain the iron level in water.

Iron can exist as ferrous (Fe^{2+}) or ferric (Fe^{3+}) ions. The HANNA test kit determines total iron levels in water via a colorimetric method. First all ferric ions are reduced by sodium sulfite to ferrous ions. Phenanthroline complexes with ferrous ion to form an orange colored solution. The color intensity of the solution determines the iron concentration.

HI 38039 Iron Test Kit

Low Range with Checker Disc

HI 38040 Iron Test Kit

Medium Range with Checker Disc

HI 38041 Iron Test Kit

High Range with Checker Disc

HI 3889 Iron & Total Hardness Test Kit with Checker Disc



HI 38040 Iron

ORDERING INFORMATION

HI 3834 test kit comes with 50 packets iron reagent, color comparison cube and 20 mL plastic vessel

HI 38039 and **HI 38040** test kits come with 100 packets iron reagent, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

HI 38041 test kit comes with 100 packets iron reagent, 500 mL deionized water, checker disc, glass vials with caps (2), 3 mL plastic pipettes and long plastic pipette.

HI 3889 test kit comes with 50 packets iron reagent, color comparison cube, 20 mL plastic vessel, 30 mL hardness MR reagent and 50 mL calibrated plastic vessel.

ACCESSORIES

HI 3834

HI 3834-050 Spare reagent for 050 tests

HI 38039

HI 38039-100 Spare reagent for 100 tests

HI 38040

HI 38040-100 Spare reagent for 100 tests

HI 38041

HI 38041-100 Spare reagent for 100 tests

HI 3889

HI 3834-050 Spare reagent for 50 tests



HI 3834 Iron

Iron is naturally present in water in low concentrations, but it reaches high concentrations in wastewater effluents. The iron concentration in water needs to be monitored because it becomes harmful above certain levels.

In domestic water, for instance, iron can unpleasantly alter the taste, stain laundry, damage kitchenware and favor the growth of certain bacteria. Iron is also an indicator of ongoing corrosion in industrial plants or in water cooling and heating systems. Moreover, iron is normally monitored in mining wastewater to avoid contamination.

Generally, ground and surface water contains no more than 1 mg/L (ppm) iron; but due to mining and industrial drainage, higher levels of iron have been observed. Iron in water appears to be more of a nuisance than a hazard.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3834 Iron (Fe^{+2} & Fe^{+3})					
colorimetric	0-5 mg/L (ppm)	1 mg/L (ppm)	phenanthroline	50	142.5 g
HI 38039 Iron (Fe^{+2} & Fe^{+3})					
checker disc	0.00-1.00 mg/L (ppm)	0.02 mg/L (ppm)	phenanthroline	100	436 g
HI 38040 Iron (Fe^{+2} & Fe^{+3})					
checker disc	0.0-5.0 mg/L (ppm)	0.1 mg/L (ppm)	phenanthroline	100	427 g
HI 38041 Iron (Fe^{+2} & Fe^{+3})					
checker disc	0.0-10.0 mg/L (ppm)	0.2 mg/L (ppm)	phenanthroline	100	980 g
HI 3889 Iron and Total Hardness					
colorimetric	Fe: 0-5 mg/L (ppm)	Fe: 1 mg/L (ppm)	phenanthroline	50 avg.	260 g
titration	40-500 mg/L (ppm)	20 mg/L (ppm)	EDTA		

Magnesium, Manganese

1

HANNA CHECKER®HC SERIES AND CHEMICAL TEST KITS



HI 38042 Manganese

Magnesium is a common constituent of natural waters; its average abundance in streams is 4 mg/L and in groundwaters is >5 mg/L. In concentration greater than 125 mg/L it can cause a diuretic effect. The aqueous species is often Mg^{2+} and it does not normally result in precipitation (as dolomite) in natural waters. Magnesium is also an important contributor to the hardness of water: when heated, magnesium salts break down forming incrustation in boilers. Moreover magnesium is necessary to plant metabolism since it is an essential constituent of organic molecules such as chlorophyll.

Manganese is not present in natural waters but it is found in various salts and minerals frequently associated with iron compounds. Manganese salts are used as fertilizer additives, in ferroalloys (in steel manufacture), in nonferrous alloys as it improves their corrosion resistance and hardness.

Manganese is not considered to be toxic to man and aquatic life and it is ingested as a trace nutrient, both in food and water. Nonetheless manganese has been limited in drinking water since it causes tenacious stains to laundry and because it produces an objectionable taste in beverages.

Manganese is commonly found in domestic wastewater, industrial effluents and receiving streams.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 38079 Magnesium in irrigation water					
titration	0.0-24.0 mg/L (ppm) 0.0-725.0 mg/L (ppm)	2.4 mg/L (ppm) 7.3 mg/L (ppm)	EDTA	100 avg.	873 g
HI 38042 Manganese					
checker disc	0.0-3.0 mg/L (ppm)	0.2 mg/L (ppm)	sodium periodate	100	560 g
HI 38072 Manganese					
checker disc	0.0-10.0 mg/L (ppm)	0.5 mg/L (ppm)	sodium periodate	100	1100 g

HI 38079 Magnesium Test Kit for Irrigation Water

By using the HI 38079 HANNA test kit, it is possible to differentiate between calcium and magnesium, since the kit determines only the magnesium ions.

The HANNA test kit determines magnesium in irrigation water via a titrimetric method. Calcium, if present, is removed by prior filtration. Then the indicator chelates with magnesium to form a red colored complex; as EDTA is added, magnesium complexes with it: the reaction endpoint is indicated by a change in color of the indicator from red to blue.

HI 38042 Manganese Low Range Test Kit

The HANNA test kit determines manganese concentration via a checker disc. The reaction between manganese and reagents causes a violet tint in the sample which is proportional to the manganese concentration.

HI 38072 Manganese Test Kit for Irrigation Water

ORDERING INFORMATION

HI 38079 test kit comes with 25 mL buffer reagent, 100 packets oxalate reagent, 120 mL EDTA solution, 100 mL buffer solution, 10 mL calmagite indicator, demineralizer bottle with filter cap for 12 L, 20 mL calibrated vessel, 50 mL calibrated vessel, large funnel and 100 paper filter discs.

HI 38042 test kit comes with 100 packets of buffer reagent A, 100 packets manganese reagent B, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

HI 38072 test kit comes with 100 packets buffer reagent A, 100 packets manganese reagent B, 230 mL deionized water (2), checker disc, glass vials with caps (2) and 3 mL plastic pipette.

ACCESSORIES

HI 38079

HI 38079-100 Spare reagent for 100 tests

HI 38042

HI 38042-100 Spare reagent for 100 tests

HI 38072

HI 38072-100 Spare reagent for 100 tests

Nitrate

HI 38050 Nitrate Test Kit for Soil and Irrigation Water

The HANNA nitrate test kit for soil and irrigation water makes it possible to determine the need for nitrogen fertilization. It also obtains the best crop response and avoids over-fertilization.

Nitrate is reduced to nitrite in the presence of cadmium. The nitrite thus produced reacts with the reagent to yield an orange compound. The amount of color developed is proportional to the concentration of nitrate present in the aqueous sample.

The HANNA nitrate-nitrogen test can be performed the whole year round, but testing is particularly recommended during spring and late spring, when rainfall and temperature related bursts of microbiological activity often have great influence on the availability of nitrate-nitrogen.

HI 3874 Nitrate Test Kit

Nitrate ions are present in trace amounts in surface water and in higher levels in some groundwater. Nitrate is found only in small quantities in domestic wastewater but can reach higher concentration (up to 30 mg/L as nitrogen) in the outflow of nitrifying biological treatment plants. Excessive amounts can contribute to methaemoglobinemia: infant death and adult illness. In order to prevent this, a 10 mg/L limit (as nitrogen) has been imposed on drinking water.



ORDERING INFORMATION

HI 38050 test kit comes with 200 packets nitrogen reagent, checker disc, glass vials with caps (2), 10 g calcium sulfate, demineralizer bottle with filter cap for 12 L, soil sieve, 50 mL plastic test tube with screw cap, large funnel, 100 paper filter discs, brush, 50 mL calibrated vessels (2), 2 g sample cup, 3 mL plastic pipette and spoons (2)

HI 3874 test kit comes with 100 packets nitrate reagent, glass cuvette and color comparison cube.

ACCESSORIES

HI 38050

HI 38050-200 Spare reagent for 200 tests
HI 3874

HI 3874-100 Spare reagent for 100 tests

HI 3874-99 Spare color comparison cube



Nitrogen (N) is an indispensable element for plant life. It is present in proteins, vitamins, chlorophyll, etc. Nitrogen allows the development of the vegetative activity of the plant, in particular, causes a lengthening of trunks and sprouts and increases the production of foliage and fruit. It directly increases the crop yield, though the crop quality depends on other elements.

Nitrogen, mostly absorbed by plants as nitrate (NO_3^-), derives from the mineralization of organic matter and the application of fertilizers. Nitrate-nitrogen is not durable in soil. The large amount required for crop production, makes it necessary to administer this element in moderate quantities during the crop growth season.

An excess of nitrogen weakens plants' structure creating an unbalanced relationship between the green and wooden parts. In addition, the plant becomes less resistant to diseases. Furthermore excessive nitrogen fertilization can contaminate groundwater and cause environmental problems.

Nitrogen is the most abundant element present on our planet and can be found in many different forms. Only a very small part of the total nitrogen is available for plant growth. The exchanges between available and unavailable nitrogen combine to form a complex system which is called the nitrogen cycle.

A very important source of nitrogen available for plants is the decomposition (mineralization and nitrification) of organic matter, the so called "turnover"; however only part of the organic matter decomposes during the crop growth season. The decomposition rate depends strongly on the local climate, the physical structure and microbiological activities in the soil, thus it varies from year to year. Other important sources of nitrogen are fertilization and irrigation when nitrogen compounds are present in the irrigation water. Even rain and snow can contribute, dissolving the **nitrate**, nitrite and ammonia normally present in the atmosphere and carrying them to the soil. Available nitrate-nitrogen can be lost from the soil in several ways. The most significant ones are leaching, which occurs during heavy rainfall or where excessive irrigation is used. Another is assimilation by crops. It is estimated that in natural soils (woods, forests) about 80% of the absorbed nitrogen is replenished when trees shed their leaves. In case of crops, the assimilated nitrogen is lost from soil during harvesting. Testing the soil during the crop cycle is a useful tool for next cultivation, in order to plan fertilization and to know the residues of fertilizers in relation to the crop, tillage and climate. An analysis can highlight shortages and help in understanding the causes of an abnormal growth.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3874 Nitrate (as NO_3^--N)					
colorimetric	0-50 mg/L (ppm)	10 mg/L (ppm)	cadmium reduction	100	156 g
HI 38050 Nitrate (as NO_3^--N) in irrigation water and soil					
checker disc	water: 0-50 mg/L (ppm)	water: 1 mg/L (ppm)	cadmium reduction	100	1026 g
	soil: 0-60 mg/L (ppm)	soil: 2 mg/L	cadmium reduction	100	

Nitrite, Dissolved Oxygen, Ozone

1

HANNA CHECKER® HC SERIES AND CHEMICAL TEST KITS



HI 3810 Dissolved Oxygen

Nitrites are intermediate oxidation state of nitrogen (in the oxidation of ammonia to nitrate or in the reduction of nitrate). Such oxidation/reduction may occur in wastewater of treatment plants and in natural waters during the biological decomposition of nitrogen-compounds. In small quantities it can cause methaemoglobinemia among infants.

Conversely, high levels are used to inhibit corrosion in cooling towers. Nitrosation reactions of nitrites can yield organic nitrosamines, which are known to be carcinogenic.

The concentration of **dissolved oxygen** in water is extremely important in nature as well in man's environment. In the oceans, lakes, rivers, and other surface water bodies, dissolved oxygen is essential to the growth and development of aquatic life. Without oxygen, the water can become toxic due to the anaerobic decaying of organic matter. In man's environment, water must contain at least 2 mg/L of oxygen to protect water pipes from corrosion. However, boiler system water, in many cases, cannot contain greater than 10 mg/L oxygen.

Ozone is an oxidizing agent and a germicide. It is used for oxidation of organic matter, which produces color or odor in drinking water.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3873 Nitrite (as NO₂⁻-N)					
colorimetric	0.0-1.0 mg/L (ppm)	0.2 mg/L (ppm)	chromotropic acid	100	169 g
HI 38051 Nitrite (as NO₂⁻-N)					
checker disc	0.00-0.50 mg/L (ppm)	0.01 mg/L (ppm)	chromotropic acid	100	446 g
HI 3810 Oxygen, Dissolved					
titration	0.0-10.0 mg/L (ppm)	0.1 mg/L (ppm)	modified Winkler	110 avg.	910 g
HI 38054 Ozone					
checker disc	0.0-2.3 mg/L (ppm)	0.1 mg/L (ppm)	DPD	100	966 g

HI 3873 Nitrite Test Kit

The HI 3873 HANNA test kit determines the nitrite concentration in water via color comparison cube.

Nitrites react with chromotropic acid reagent to form a pink tint in the sample. The amount of color developed is proportional to the concentration of nitrite present in the aqueous sample.

HI 38051 Nitrite Test Kit

The HI 38051 HANNA test kit determines the nitrite concentration in water via checker disc.

HI 3810 Dissolved Oxygen Test Kit

The HANNA dissolved oxygen portable test kit can determine the oxygen concentration in water quickly and easily. A modified Winkler method is used. Manganese ions react with oxygen in the presence of potassium hydroxide to form a manganese oxide precipitate. An azide is present to prevent any nitrite ions from interfering with the test. On addition of acid, manganese oxide hydroxide oxidizes the iodide to iodine. Since the amount of iodine generated is equivalent to the oxygen in the sample, the concentration of iodine is calculated by titration of thiosulfate ions that reduce the iodine back to iodide ions.

HI 38054 Ozone Test Kit

The HANNA test kit for ozone determines the ozone concentration in water via checker disc. The reaction between ozone and the reagent causes a pink tint in the sample which is proportional to the ozone concentration.

ORDERING INFORMATION

HI 3873 test kit comes with 100 packets nitrite reagent, glass cuvette and color comparison cube.

HI 38051 test kit comes with 100 packets nitrite reagent, glass vials with caps (2) and 3 mL plastic pipette.

HI 3810 test kit comes with 30 mL manganous sulfate solution, 30 mL alkali-azide reagent, 60 mL sulfuric acid solution (2), 10 mL starch indicator, 120 mL titrant solution, glass bottle with stopper, 10 mL calibrated vessel and calibrated syringe with tip.

HI 38054 test kit comes with 100 packets ozone reagent, 500 mL deionized water, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

ACCESSORIES

HI 3873

HI 3873-100 Spare reagent for 100 tests

HI 38051

HI 38051-100 Spare reagent for 100 tests

HI 3810

HI 3810-100 Spare reagent for 100 tests

Chemical Test Kits

pH**HI 3880 Test Kit**

pH 4.0-6.5

HI 3880/0 Test Kit

pH 4.0-6.5

HI 3881 Test Kit

pH 6.0-8.5

HI 3881/0 Test Kit

pH 6.0-8.5

HI 3881-5 Test Kit

pH 4.0-8.0

HI 3882 Test Kit

pH 3.0-5.0

HI 3886 Test Kit

pH 7.5-10.0

HI 3886/0 Test Kit

pH 7.5-10.0

HI 38058 Test Kit

pH 4.0-10.0

ORDERING INFORMATION

HI 3880 test kit comes with 25 mL pH 4.0-6.5 reagent and color cube comparison.

HI 3880/0 test kit comes with 25 mL pH 4.0-6.5 reagent, 10 mL dechlorinating reagent and color comparison cube.

HI 3881 test kit comes with 25 mL pH 6.0-8.5 reagent and color comparison cube.

HI 3881/0 test kit comes with 25 mL pH 6.0-8.5 reagent, 10 mL dechlorinating reagent and color comparison cube.

HI 3881-5 test kit comes with 25 mL pH 4.0-8.0 reagent, test tube with cap and color chart.

HI 3882 test kit comes with 25 mL pH 3.0-5.0 reagent, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

HI 3886 test kit comes with 25 mL pH 7.5-10.0 reagent and color comparison cube.

HI 3886/0 test kit comes with 25 mL pH 7.5-10.0 reagent, 10 mL dechlorinating reagent and color comparison cube.

HI 38058 test kit comes with 30 mL pH 4.0-10.0 reagent, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

ACCESSORIESHI 3880**HI 3880-100** Spare reagent for 100 testsHI 3881**HI 3881-100** Spare reagent for 100 testsHI 3881/0**HI 3881-010** Spare reagent for 100 tests + dechlorinating reagentHI 3882**HI 3882-100** Spare reagent for 100 testsHI 3886 and HI 3886/0**HI 3886-100** Spare reagent for 100 testsHI 38058**HI 38058-100** Spare reagent for 300 tests**HI 3880 pH****HI 3881 pH**

pH represents acidity or alkalinity of an aqueous solution and is proportional to the hydrogen-ion concentration of the solution. Under neutral conditions water is dissociated into the $(OH)^-$ and H^+ ions in equal ratio and hence it has a pH of 7. When bases or acids are added to a water solution they ionize, increasing the concentration of $(OH)^-$ or H^+ , respectively. Thus solutions with a pH of 1-3 contain strong acids, whereas those with a pH of 4-6 contain weak acids.

Examples of pH value for some liquids

Liquid	pH Value
Sea water	7.8-8.2
Gastric juices	1.7
Milk	6.5-7
Soil	6-7 (optimum for crops)

Weak bases result in solutions of pH 8-10 and strong bases in pH of 11-13.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3880 pH					
colorimetric	4.0-6.5 pH	0.5 pH	pH indicator	100	110 g
HI 3880/0 pH					
colorimetric	4.0-6.5 pH	0.5 pH	pH indicator	100	150 g
HI 3881 pH					
colorimetric	6.0-8.5 pH	0.5 pH	pH indicator	100	110 g
HI 3881/0 pH					
colorimetric	6.0-8.5 pH	0.5 pH	pH indicator	100	150 g
HI 3881-5 pH					
color card	4.0-8.0 pH	/	pH indicator	200	37 g
HI 3882 pH					
checker disc	3.0-5.0 pH	0.1 pH	pH indicator	200	215 g
HI 3886 pH					
colorimetric	7.5-10.0 pH	0.5 pH	pH indicator	100	110 g
HI 3886/0 pH					
colorimetric	7.5-10.0 pH	0.5 pH	pH indicator	100	150 g
HI 38058 pH					
checker disc	4.0-10.0 pH	0.5 pH	pH indicator	300	215 g

Phenols, Phosphate

1

HANNA CHECKER® HC SERIES AND CHEMICAL TEST KITS



HI 3864 Phenols



HI 3833 Phosphate

Phenols are widely used in pharmaceuticals, dyes and indicators and as general disinfectants. They may occur in household and industrial wastewaters and in natural waters; they can also enter potable water supplies and chlorination of such waters results in malodorous chlorophenol products that are detectable from 0.001 mg/L (1 ppb). The HANNA colorimetric method determines phenol and all ortho and para substituted phenols. Since substitution generally lowers the response, the readable value obtained by this method is the minimum concentration of phenolic compounds present. Natural water usually contains less than 0.001 mg/L of phenols, but sometimes values up to 0.02 mg/L (20 ppb) also occur. Since the concentration of phenols in wastewater is generally subjected to biological and chemical degradation, preserve samples in the refrigerator and analyze within four hours after collection.

Phosphates are widely introduced into the environment from such sources as agricultural fertilizers, cleaning and laundering products, boiler water conditioners, and drinking water treatment aids. At high levels, phosphates stimulate the growth of photosynthetic organisms which may contribute to eutrophication of lakes, rivers, and ponds. This makes it important to monitor and control phosphate discharges into the environment.

Phosphorus occurs in natural waters and in wastewaters almost entirely as phosphates (PO_4^{3-}). Large quantities of phosphate arise from laundering industries as it is used in many cleaning preparations, from soil runoff and sewage.

Phosphorus is essential to plants since it contributes to the formation of buds, roots and blooming as well as lignification. A lack of phosphorus results in stunted plants or a pale green color on leaves with reddish pigmentation on the edges.

However, an extensive discharge of phosphorus in water is the major cause of eutrophication, which is an abnormal and excessive growth of aquatic plants.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3864 Phenols					
checker disc	0.00-1.00 mg/L (ppm) 0.5-5.0 mg/L (ppm)	0.02 mg/L (ppm) 0.1 mg/L (ppm)	aminoantipyrine	100	573 g
HI 3833 Phosphate (as PO_4^{3-})					
colorimetric	0-5 mg/L (ppm)	1 mg/L (ppm)	ascorbic acid	50	160 g
HI 38077 Phosphate (as PO_4^{3-})					
checker disc	0.0-5.0 mg/L (ppm)	0.1 mg/L (ppm)	ascorbic acid	100	429 g
HI 38061 Phosphate (as PO_4^{3-})					
checker disc	0.00-1.00 mg/L (ppm) 0.0-5.0 mg/L (ppm) 0-50 mg/L (ppm)	0.02 mg/L (ppm) 0.1 mg/L (ppm) 1 mg/L (ppm)	ascorbic acid	100	1010 g

HI 3864 Phenols Test Kit

The HANNA test kit for phenols determines the phenol concentration in water via checker disc. Phenolic compounds react to form a yellow to orange dye with 4-amino antipyrine in alkaline solution buffered at pH about 10. The absorbance of this colored product is proportional to the concentration of phenols present in the aqueous sample.

HI 3833 Phosphate Test Kit

The orthophosphate level in mg/L (or ppm) is determined by a colorimetric method. Ammonium molybdate and potassium antimonyl tartrate react in acid medium with orthophosphate to form a phosphomolybdate complex, that is reduced to intensely colored molybdenum blue by ascorbic acid. The color intensity of the solution determines the phosphate concentration. Phosphates can be classified as ortho, condensed or organically bound. As with existing test kits on the market, the HANNA Phosphate Test Kit will only determine ortho phosphate levels.

HI 38061 Phosphate Test Kit with Checker Disc

The reaction between phosphate and the reagent causes a blue tint in the sample; adaptation of the ascorbic acid method.

HI 38077 Phosphate Test Kit for Irrigation Water

The HANNA Test Kit for phosphate determines the phosphate concentration in irrigation water via checker disc.

ORDERING INFORMATION

HI 3864 test kit comes with 100 packets reagent A, 100 packets reagent B, checker discs (2), glass vials with caps (2) and mirror

HI 3833 test kit comes with 20 mL plastic beaker, color comparison cube and 50 packets phosphate reagent.

HI 38077 test kit comes with 100 packets phosphate reagent, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

HI 38061 test kit comes with 100 packets phosphate reagent, 500 mL deionized water, checker disc, glass vials with caps (2), 3 mL plastic pipette and long plastic pipette.

ACCESSORIES

HI 3864

HI 3864-100 Spare reagent for 100 tests

HI 3833

HI 3833-050 Spare reagent for 50 tests

HI 3833-99 Spare color comparison cube

HI 38077

HI 38077-100 Spare reagent for 100 tests

HI 38061

HI 38061-100 Spare reagent for 100 tests

Phosphorus, Potassium

HI 38073 Phosphorus Test Kit for Soil

The HANNA test kit for phosphorus determines the phosphorus concentration via checker disc.

The reaction between phosphate and the reagent causes a blue tint in the sample and uses an adaptation of the ascorbic acid method.

HI 38082 Potassium Test Kit for Soil

Potassium is present in tissues responsible for the growth of plants (primary and secondary meristems). It plays an important role in how much water is absorbed by the roots and in the regulation of cellular activity. In addition, potassium makes plants more resistant to diseases and yields a positive effect on the color and fragrance in flowers. Potassium deficiency is a frequent problem in calcareous soils.

The HANNA test kit determines potassium in soil via a turbidimetric method. Potassium is precipitated in a basic environment with sodium tetraphenylborate. The developed turbidity is proportional to potassium concentration.

ORDERING INFORMATION

HI 38073 test kit comes with 100 packets phosphorus reagent, checker disc, glass vials with caps (2) and 1 mL syringe with tip.

HI 38082 test kit comes with 25 mL formaldehyde solution (4), 100 mL potassium reagent A (3), 100 packets potassium reagent B, 50 mL long glass test tube, 50 mL calibrated vessel, 1 mL plastic pipette, 3 mL plastic pipette, 1 mL syringe with tip, spoon, graduated card and point card.

ACCESSORIES

HI 38073

HI 38073-100 Spare reagent for 100 tests

HI 38082

HI 38082-100 Spare reagent for 100 tests



HI 38073 Phosphorus

Phosphorus is an important element in the composition of DNA and RNA, the regulators of the energetic exchange (ATP, ADP) as well as the reserve substances in seeds and bulbs. Phosphate compounds within plants act as storage areas for energy derived from photosynthesis and carbohydrates. This stored energy can be used in future growth and reproductive processes of the plant.

Phosphorus contributes to the formation of buds, roots and blooming as well as lignification (process of depositing lignin in cell wall), which helps to bolster their strength and stiffness.

A lack of phosphorus can result in a stifling of the plant, slow growth, reduced production, smaller fruits, and a decreased expansion of roots. Since phosphorus does not move freely through soil, fertilizers containing phosphorus must be placed close to the root system of plants, preferably early in a plant's growth when the needs for phosphorus is greatest.

Phosphorus belongs to the primary macronutrient group. It is an essential element to plant growth and is needed in large amounts. Phosphorus exists in soil mainly as P. It is adsorbed at the surfaces of iron and aluminum oxides or in association with calcium. It also occurs in organic forms and may be released by microbial activity. It is absorbed by roots only in its maximum oxidation state as the orthophosphoric ion (H_2PO_4^- or $(\text{HPO}_4)^{2-}$, depending on the pH. Moreover, its absorption is mostly efficient for pH values between 5 and 7: this implies that acidic or calcareous soil needs to be corrected to neutral pH values for better tillage yield.

The importance of **potassium** to plant growth differs somewhat from nitrogen and phosphorus, in that potassium acts as more of a catalyst in plant carbohydrate metabolism. Over 60 plant enzymes need potassium to be activated. Activation occurs when potassium ions attach to the surface of enzyme molecules, resulting in a change to the shape of the molecule.

Other important functions of potassium are its ability to help with the regulation of water in plants, its contribution to the formation of ATP molecules, and as a necessary component for nitrogen uptake and protein synthesis. Plants without adequate potassium use water less efficiently, plants with increased supplies of potassium are able to more quickly assimilate carbon dioxide into sugars during photosynthesis, and plants low in potassium usually have lower nitrogen intake and protein synthesis activity.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 38073 Phosphorus (in soil)					
checker disc	0.0-130.0 mg/L (ppm)	3.3 mg/L (ppm)	ascorbic acid	100	435.5 g
HI 38082 Potassium (in soil)					
turbidimetric	0-50 mg/L (ppm) 50-250 mg/L (ppm)	5 mg/L (ppm) 25 mg/L (ppm)	turbidimetric	100	889 g

Salinity, SAR, Exchangeable Sodium (EES) and Gypsum Requirement (GR)



HI 3835 Salinity

Salinity is defined as the total solids in water after all carbonates have been converted to oxides, all bromide and iodide have been replaced by chloride and all organic matter has been oxidized. The value is in g/kg or ppt (parts per thousand). The monitoring of salinity is essential for industrial waste and seawater.

Sodium is one of the most studied elements because of its toxic effects to both soil texture and crops. High concentrations of sodium disperses soil colloidal particles, rendering the soil hard and resistant to water penetration. The build-up of osmotic pressure in soil due to high sodium concentration causes difficulty in water absorption by plant roots. Plants are sensitive to varying degrees of soil salinity and when this exceeds a certain limit their growth is impaired, thus lowering their productivity.

High amounts of sodium can be mitigated by presence of large quantities of calcium and magnesium in soil or with distribution of gypsum (calcium sulfate) directly on soil or as an additive to irrigation water.

Alkaline soils are characterized by a low electrical conductivity (EC), high **exchangeable sodium** percentage (ESP) and presence of carbonate and bicarbonate sodium salts. Hydrolysis of carbonate causes also an increase in pH, such that it is always greater than 8.5.

The "saline-sodic" soil group, which possesses the following peculiarities, also belongs to this alkaline group: EC > 4 mS/cm, ESP > 15, pH ≤ 8.5

High alkalinity causes impairment to plant growth since it gives rise to an incomplete solubilization of necessary nutrients such as iron, copper and manganese. Chlorosis, for instance, is a typical disease of leaves due to iron deficiency.

It is possible to correct soil alkalinity by adding a proper compound (generally gypsum) that removes sodium and decreases the pH.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3835 Salinity					
titration	0.0-40.0 g/kg	0.4 g/kg	mercuric nitrate	110 avg.	460 g
HI 38078 SAR					
DiST®4 + test kit	> 0.0 meq/L	0.2 meq/L	titration	100 avg.	785 g
HI 38083 Gypsum Requirements & Exchangeable Sodium Test Kit					
titration	EES: 0.00-56.40 meq GR: 0.0-213.0 metric ton/ha	1.95 meq/100 g soil GR: 3.8 metric ton/ha	calcium sulfate	100	883 g

HI 3835 Salinity Test Kit

The HANNA test kit measures salinity using a fast and efficient titrimetric method. The test requires only a few simple and safe steps to obtain results. The salinity level in g/kg is determined by a mercuric nitrate titration method. The pH is lowered to approximately 3 by addition of nitric acid. Mercuric ions react with chloride ions to form mercuric chloride. When excessive mercuric ions are present, it complexes with diphenylcarbazone to form a purple solution. The color change from yellow to violet indicates the endpoint.

HI 38078 Sodium Adsorption Ratio (SAR) Test Kit

The HANNA test kit determines sodium hazard in irrigation water by calculation of SAR (Sodium Adsorption Ratio) in relation to calcium and magnesium concentration.

HI 38083 Gypsum Requirements & Exchangeable Sodium Test Kit

The exact quantity of gypsum needed for correction can be calculated with the HANNA gypsum requirement test kit. The extraction method is the saturated calcium sulfate method. The Test Kit determines gypsum requirement by titration of calcium. The indicator chelates with calcium ions to form a red colored complex. As EDTA is added, calcium complexes with it; the reaction endpoint is indicated by a change in color of the indicator from red to blue.

ORDERING INFORMATION

HI 3835 test kit comes with 15 mL diphenylcarbazone indicator, 30 mL nitric acid solution, 120 mL titrant solution, plastic vial and 1 mL calibrated syringe with tip.

HI 38078 test kit comes with DiST®4 EC meter (with instructions and screwdriver), 5000 µS/cm calibration standard sachets (2), 100 mL buffer solution, 10 mL calmagite indicator, 120 mL EDTA solution, demineralizer bottle with filter cap for 12 L, 50 mL calibrated vessel, 3 mL plastic pipette, 1 mL plastic pipette and 1 mL syringe.

HI 38083 test kit comes with 10 g calcium sulfate, 30 mL buffer solution, 100 mL EDTA solution (3), 10 mL calmagite indicator, demineralizer bottle with filter cap for 12 L, soil sieve, 14 mL plastic test tube with screw cap, 50 mL plastic test tube with screw cap, small funnel, 100 paper filter discs, brush, 50 mL calibrated vessel, 20 mL calibrated vessels with caps (2), 3 mL plastic pipette, 1 mL plastic pipette, 1 mL syringe with tip and spoons (2).

ACCESSORIES

- HI 3835**
HI 3835-100 Spare reagent for 100 tests
HI 38078
HI 38078-100 Spare reagent for 100 tests
HI 38083
HI 38083-100 Spare reagent for 100 tests

Silica, Sulfate

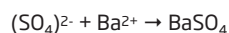
HI 38066 Silica Low Range Test Kit and HI 38067 Silica High Range Test Kit

Determination of silica concentration is an adaptation of the ASTM D859 method of the heteropoly blue method. The reaction between silica and reagents causes a blue tint in the sample which is proportional to the silica concentration.

HI 38000 Sulfate Test Kit

The procedure for determining sulfate is a modification of the barium sulfate turbidimetric method.

Sulfate is precipitated as barium sulfate by reaction with barium chloride in acidic medium. The turbidity is proportional to the concentration of sulfate:



HI 38001 Sulfate Low and High Range Test Kit

The procedure for determining sulfate is a modification of the Determination of Sulfate by Sulfonazo III. Sulfate is determined via a titrimetric method. The reaction end point is indicated by the change in color of the solution from violet to blue.

ORDERING INFORMATION

HI 38066 test kit comes with 25 mL silica reagent A, 100 packets silica reagent B, 100 packets silica reagent C, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

HI 38067 test kit comes with 25 mL silica reagent A, 100 packets silica reagent B, 100 packets silica reagent C, demineralizer bottle with filter cap for 12 L, checker disc, glass vials with caps (2), 3 mL plastic pipette and 1 mL syringe with tip.

HI 38000 test kit comes with 100 packets sulfate reagent A, 53 g sulfate reagent B, 10 mL complexing agent, 50 mL glass test tube, 50 mL plastic vessel, 3 mL plastic pipette and spoon.

HI 38001 test kit comes with 100 packets sulfate reagent A (2 sets), 100 mL LR sulfate reagent B, 100 mL HR sulfate reagent B, 10 mL sulfate reagent C, 20 mL complexing agent, 30 mL sulfate solution, 50 mL plastic vessels (2) and 1 mL syringes (2).

ACCESSORIES

HI 38066

HI 38066-100 Spare reagent for 100 tests
HI 38067

HI 38067-100 Spare reagent for 100 tests
HI 38000

HI 38000-10 Spare reagent for 100 tests

HI 38001

HI 38001-10 Spare reagent for 100 tests



HI 38000 Sulfate

Silicon is not free in nature, but rather as **silica** (SiO_2) in crystalline forms, combined with other oxides and metals in a variety of silicates. Silicon is usually reported as silica when rocks, sediments, soil and water are analyzed. Silica is only slightly soluble in water; solubility and form of silica in water depend on pH of water and on the minerals, containing silica, in contact with water. The silica content of natural water is in the 5 to 25 ppm range. It is important to estimate silica concentration in case of some industrial installation such as steam generation and cooling water systems.

Sulfate is largely present in natural waters in a wide range of concentrations. It is not toxic but has to be kept below a certain threshold to prevent it from creating an unpleasant taste in water. The concentrations are particularly higher close to mine run-off water. Sulfate is extensively used as a nutrient in agriculture.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 38066 Silica					
checker disc	0.00-1.00 mg/L (ppm)	0.02 mg/L (ppm)	colorimetric	100	580 g
HI 38067 Silica					
checker disc	0-40 mg/L (ppm) 0-800 mg/L (ppm)	1 mg/L (ppm) 40 mg/L (ppm)	colorimetric	100	712.5 g
HI 38000 Sulfate (as SO_4^{2-})					
turbidimetric	20-100 mg/L (ppm)	5 mg/L (ppm)	barium chloride	100	290 g
HI 38001 Sulfate (as SO_4^{2-})					
titration	100-1000 mg/L (ppm) 1000-10000 mg/L (ppm)	10 mg/L (ppm) 100 mg/L (ppm)	barium chloride	200	640 g

**HI 3822 Sulfite**

There are many reasons to monitor **sulfite** concentration in water. In industrial applications, a sulfite concentration of approximately 20 mg/L must be maintained to prevent pitting and oxidation of metal components as in boiler feed and effluent waters. A high level of sulfite results in a lowered pH, thus promoting corrosion. The monitoring of sulfite is important in environmental control. Sulfite ions are toxic to aquatic lifeforms and their ability to remove dissolved oxygen in water will destroy the delicate balance of ecology of lakes, rivers and ponds.

Zinc is widely used in alloys (brass, bronze, and dye-casting alloys), in galvanizing iron and other metals, and also as a fungicide. It is also an essential growth element in human diet. But with concentrations higher than 5 mg/L, it gives a bitter taste to water and opalescence to alkaline water.

Zinc can enter the domestic water supply from the deterioration of galvanized iron and dezincification of brass.

METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS	WEIGHT
HI 3822 Sulfite (as Na_2SO_3)					
titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	0.2 mg/L (ppm) 2 mg/L (ppm)	iodometric	110 avg.	910 g
HI 3854 Zinc (as Zn^{+2})					
colorimetric	0.0-3.0 mg/L (ppm)	0.6 mg/L (ppm)	zincon	100	250 g
HI 38076 Zinc (as Zn^{+2})					
checker disc	0.0-4.0 mg/L (ppm) 0.0-20.0 mg/L (ppm)	0.1 mg/L (ppm) 0.4 mg/L (ppm)	zincon	100	647 g

HI 3822 Sulfite Test Kit

The HANNA sulfite test kit makes monitoring easy, quick and safe. The compact size gives the user the versatility to use the kit practically anywhere. The design of the kit makes it practically impossible to spill the reagents, thereby reducing the possibility of injury or damage to property.

The method used is an iodometric method. Iodide ions react with iodate ions in the presence of sulfuric acid to form iodine.

The sulfite present in the water sample then reduces the iodine back to iodide.

An excess of iodate ions will generate additional iodine, which will form a blue complex with starch. This color change determines the end point of this titration.

HI 3854 Zinc Test Kit

Zinc reacts with the zincon reagent to form a brownish-green to blue complex in a solution buffered at alkaline pH.

Since other metals can form colored complexes with zincon, cyanide is added to complex zinc and any other heavy metal present. Then, cyclohexanone is added to selectively free zinc from its cyanide complex so that it can react with zincon to form the final blue colored product. The amount of color developed is proportional to the concentration of zinc present in the aqueous sample.

HI 38076 Zinc Test Kit

with Checker Disc

ORDERING INFORMATION

HI 3822 test kit comes with 30 mL sulfamic acid solution, 30 mL EDTA reagent, 15 mL sulfuric acid solution, 10 mL starch indicator, 120 mL titrant solution, 20 mL calibrated vessel, 50 mL calibrated vessel and calibrated syringe with tip.

HI 3854 test kit comes with 100 packets zinc reagent A, 60 mL zinc reagent B (2), color comparison cube, 10 mL glass cuvette with HDPE stopper, 1 mL syringe, 20 mL calibrated vessel and plastic spoon.

HI 38076 test kit comes with 100 packets zinc reagent A, 100 mL zinc reagent B, demineralizer bottle with filter cap for 12 L, checker disc, glass vials with caps, long plastic pipette, 3 mL plastic pipette and 1 mL syringe with tip.

ACCESSORIES

- HI 3822**
HI 3822-100 Spare reagent for 100 tests
HI 3854
HI 3854-100 Spare reagent for 100 tests
HI 38076
HI 38076-100 Spare reagent for 100 tests

HI 3819 • HI 3813

Acid Mining Test Kit, Alkalinity and Acidity Test Kit

HI 3819 Acid Mining Test Kit

The HANNA combination test kit HI 3819 includes all the necessary tests for alkalinity, acidity, pH and iron. The reagent bottles are in easy-to-recognize ascending numbers to allow your tests to be more efficient.

The testing procedures are clearly shown in the step-by-step instruction manual so that anyone can carry out the analysis. For pH measurements, use our pHep electronic tester to get faster and more accurate results than conventional litmus paper.

HI 3813 Alkalinity and Acidity Combination Test Kit

This practical test kit is the ideal solution for combined testing of acidity and alkalinity. The reagent bottles are clearly coded to avoid confusion and can be purchased separately when they run out. Perform over 100 tests each of acidity and alkalinity with this kit.

This versatile test kit is supplied with a rugged and portable carrying case that is ideal for field use. It's convenient, saves time and keeps your test materials organized.



HI 3819 Acid Mining Test Kit

The acid mining industry produces discharge water which can be both acidic and alkaline, depending on the metal type. The discharge water can also contain metals such as iron. Since the run-off water will eventually find its way to lakes and rivers, it is important to test it to make sure it does not pollute the environment and water reservoirs.



HI 3813 Alkalinity and Acidity Test Kit

ORDERING INFORMATION

HI 3819 test kit includes 10 mL dechlorinating reagent, 10 mL bromophenol blue indicator (2), 10 mL phenolphthalein indicator, 120 mL acidity titrant, 10 mL calibrated vessel, 50 mL calibrated vessel, calibrated syringe, 120 mL alkalinity titrant, 100 packets iron reagent, color comparison cube and electronic pH tester.

HI 3813 test kit includes 10 mL dechlorinating reagent 10 mL bromophenol blue indicator, 10 mL phenolphthalein indicator, 120 mL acidity titrant, 10 mL calibrated vessel, 50 mL calibrated vessel, calibrated syringe and 120 mL alkalinity titrant.

ACCESSORIES

HI 3819

HI 3820-100 Reagent kit for 100 tests for acidity

HI 3811-100 Reagent kit for 100 tests for alkalinity

HI 3834-050 Replacement reagents set for 50 tests for Iron

HI 70004P pH 4.01 buffer solution, for 25 calibrations in pH 4.01

HI 70007P pH 7.01 buffer solution, for 25 calibrations in pH 7.01

HI 70010P pH 10.01 buffer solution, for 25 calibrations in pH 10.01

HI 3813

HI 3820-100 Reagent kit for 100 tests for acidity

HI 3811-100 Reagent kit for 100 tests for alkalinity

PARAMETER	METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS
HI 3819 Combination Test Kit for Acid Mining					
Acidity (as CaCO₃)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	1 mg/L (ppm) 5 mg/L (ppm)	methyl-orange/ phenolphthalein	110 avg.
Alkalinity (as CaCO₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromophenol blue	110 avg.
Iron (as Fe²⁺ & Fe³⁺)	colorimetric	0-5 mg/L (ppm)	1 mg/L (ppm)	phenanthroline	50
pH	electronic pH tester	0.0-14.0 pH	0.1 pH	—	life of the meter

OTHER INFORMATION **Dimensions/Weight** 370 x 270 x 80 mm (14.6 x 10.6 x 3.1")/1.6 kg (3.5 lb.)

HI 3813 Acidity/Alkalinity Combination Test Kit

Acidity (as CaCO₃)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	1 mg/L (ppm) 5 mg/L (ppm)	methyl-orange/ phenolphthalein	110 avg.
Alkalinity	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromophenol blue	110 avg.

OTHER INFORMATION **Dimensions/Weight** 370 x 270 x 80 mm (14.6 x 10.6 x 3.1")/1.0 kg (2.2 lbs.)

You can conveniently replace reagents separately as they run out (see Reagents section).
The number of pH tests has no limitations other than the life of the instrument itself.

The Importance of Soil Testing

Soil is not merely a support system for plants, but a complex world from which the roots obtain water and other required elements. In addition, soil is inhabited by small animals, insects, microorganisms (e.g. fungi and bacteria) which all influence the plant life in one way or another.

Soil evolution is a change in its characteristics based upon climate, presence of animals and plants as well as man's action. A natural soil, in which evolution is slow, is very different from a cultivated one.

Soil is composed of solids (minerals and organic matters), liquids (water and dissolved substances), gases (mostly oxygen and carbon dioxide) and living organisms contains. All these elements provide its physical and chemical properties.

Managing the soil properly is necessary in order to preserve its fertility, obtain better yield and respect the environment. Testing the soil however, is a must in order to manage it properly.

The physical structure of the soil depends on the dimension of the particles of its composition. In addition, the particles also differ based on their shape and volumic mass (mass per unit of volume).

Particles classification according to "International Society of Soil Science" (ISSS)

Diameter of Particles (mm)	Classification
>2	stony texture
2-0.2	coarse sand
0.2-0.02	fine sand
0.00-0.002	silt
<0.002	clay

Soil is divided into many classes of texture, according to the percentage of the basic particles (clay, sand and silt). If, for example, we have a soil with 37% clay, 38% sand and 25% silt, the soil is classified as "clay loam".

Among different types of soil, the loam soil is considered as being suitable for crop growth. However, other types of soil, with a rational management, can also provide positive results.

The soil texture is the cause of important aspects such as porosity, tenacity, adhesivity and plasticity. Porosity is important for the exchange of gases and liquids. Microporosity (porous < 2 - 10 µm) permits water to be retained while macro-porosity (porous > 10 µm) contributes to a fast circulation of air and water. Plants therefore are in need of a correct relationship between micro and macro porosity.

Clay soils have a greater micro-porosity than sandy soils and hence hold more water and remain wet for a longer period. Because of the greater tenacity and adhesivity of clay soils, they are called heavy, while sandy soils are referred to as light.

Organic matter, caused by animal and vegetable residues, is another important constituent of the solid part of the soil. Organic matter has a positive effect on the soil fertility by adding nutrients, stabilizing the pH reaction and permitting a good retainment of water.

Organic matter is also important for the activity of microorganisms and, in general, contributes towards prevention of soil erosion. The

colloidal portion, composed of micro-particles (1-100 µm), is important for holding nutrients. Since most of these particles have a negative charge, the colloidal portion has a particularly large capacity to retain cations ((NH₄)⁺, K⁺, Na⁺, Ca²⁺, Mg²⁺, etc.). The CEC (Cation Exchange Capacity) is higher in soils rich with clay and organic matter than in sandy soils.

Soil pH can be acid, neutral, or alkaline. Each plant has a range of pH in which it thrives and most plants prefer conditions near the neutral mark (pH 5.5-7.5). There are however plants that prefer acid or alkaline environments. The solubility of the nutrients, that is the ability of the plants to absorb them, depends largely on their pH value. The soil microbiological activity is also pH dependent. Most bacteria, specially those putting nutrients at the plants' disposition, prefer moderately acid or slightly alkaline conditions. The pH level hence influences the fertility of the soil.

FRUIT & VEGETABLE - Testing the nitrogen and phosphorus level in your soil is important, especially before seeding and replanting. While root vegetables need phosphorus, leafy plants require more Nitrogen.

Potassium however, helps increase the quality of the crop. With the HANNA Quick Soiltest, growers can keep these three important elements under control.



FLOWERS & SHRUBS - The right quantity of potassium is the key factor in ensuring beautiful and fragrant flowers. The other elements play an important role too in achieving quick and harmonious growth.

LAWNS - A lush lawn is the result of care and attention. In addition to tilling and irrigation, the pH and nitrogen levels need regular checks.

FRUIT & DECORATIVE TREES - Trees are the most appealing feature of our gardens. Nitrogen and phosphorus help in speeding up the growth of young plants, encouraging abundance of foliage and strengthening the trunk and the roots. Potassium, on the other hand keeps the plants in tip top condition by protecting them from diseases.

BONSAI & HOUSEPLANTS - Every time a houseplant, but in particular a bonsai is potted, the choice of soil mixture is of prime importance. Having prepared the mixture, the HANNA Quick Soiltest will in a matter of minutes test the level of pH and other elements ensuring a livelier plant.

HI 3895 • HI 3896

Agriculture Test Kits

HI 3895 Quick Soil Test Kit

HANNA's quick Soiltest provides growers with an economical way to quickly test pH as well as the three basic elements needed for a healthier plant: nitrogen (N), phosphorus (P) and potassium (K).

HI 3896 HANNA Soil Test Kit

The chemical composition of soil includes pH and chemical elements. Soil analysis is necessary for better management of fertilization and to know the residues of fertilizers in relation to the crop, tillage and the most suitable plant choice for soil composition. An analysis can highlight shortages and help the understanding of the causes of an abnormal growth. By using the HANNA Soiltest, it is possible to measure pH and the most important elements for plant growth, that is, nitrogen (N), phosphorus (P) and potassium (K).

Testing the soil during each crop cycle and comparing the results with plant growth can be a useful experiment for subsequent cultivations.



HI 3896 Agricultural Test Kit

In agricultural applications, monitoring the quality of the soil is extremely important for the health and growth of crops. The pH level is an excellent guide as to which plants may thrive in a particular terrain, as well as indicating which conditioners and fertilizers to use. HANNA combination test kits allow you to test not only for pH, but for nitrogen, phosphorous and potassium which are all important for the quality of soil as well.

ORDERING INFORMATION

HI 3895 test kit includes 40 powder packets (10 each for pH, N, P & K), 1 mL plastic pipette, test tubes (4), color cards (4) and one graduated card.

HI 3896 test kit includes 120 mL extraction solution (2), 70 mL pH indicator, 75 powder packets (25 each for N,P & K), 1 mL pipettes (3), test tubes (5), test tube stand, spoon, brush, color cards (4), graduated card and handbook.

ACCESSORIES

HI 3895

HI3895-010 Replacement reagents set for 10 tests per each parameter

HI 3896

HI3896-025 Replacement reagents set for 25 tests /each parameter

PARAMETER	METHOD	RANGE	CHEMICAL METHOD	# TESTS
HI 3895 Agriculture Test Kit, Basic				
Nitrogen	colorimetric	traces, low, medium, high	Ned	10
Phosphorus	colorimetric	traces, low, medium, high	ascorbic acid	10
pH	colorimetric	4 to 9 pH (1 pH increments)	pH indicator	10
Potassium	turbidimetric	traces, low, medium, high	tetraphenyl-borate	10
OTHER INFORMATION	Dimensions/Weight 113 x 113 x 62 mm (4.4 x 4.4 x 2.4")/105 g (3.7 oz.)			
HI 3896 Agriculture Test Kit, Pro				
Nitrogen	colorimetric	traces, low, medium, high	Ned	25
Phosphorus	colorimetric	traces, low, medium, high	ascorbic acid	25
pH	colorimetric	4 to 9 pH (1 pH increments)	pH indicator	25
Potassium	turbidimetric	traces, low, medium, high	tetraphenyl-borate	25
OTHER INFORMATION	Dimensions/Weight 235 x 176 x 117 mm (9.2 x 6.9 x 4.6")/710 g (1.6 lbs.)			

Aquaculture and Aquarium Test Kits

1

HANNA CHECKER® HC SERIES AND CHEMICAL TEST KITS



HI 3823 Aquaculture Test Kit

HI 3823 provides users with the most important test parameters for aquaculture applications: alkalinity, carbon dioxide, dissolved oxygen, hardness, pH and salinity.

Each of these parameters plays a critical role in the delicate balance of the aquatic environment: alkalinity acts as a stabilizer for pH; carbon dioxide must be monitored because of its toxic effects on fish (every species can tolerate different levels of CO₂); oxygen levels affect fish respiration and incorrect concentrations can slow down their growth rate; hardness is monitored because it diminishes the toxicity level of ammonia; pH also is measured to determine the toxicity level of the water; salinity is important because of its relation to dissolved oxygen.

HI 3893 Aquarium Test Kit

HI 3893 combines in one package four different tests, namely, ammonia, nitrate, nitrite and pH. It is an ideal kit for crab and lobster aquariums and saltwater holding tanks at wholesalers as well as retail shops.

PARAMETER	METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS
HI 3823 Combination Test Kit for Aquaculture					
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.
Carbon Dioxide (as CO ₂)	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	0.1 mg/L (ppm) 0.5 mg/L (ppm) 1 mg/L (ppm)	phenolphthalein	110 avg.
Hardness (as CaCO ₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	0.3 mg/L (ppm) 3 mg/L (ppm)	EDTA	100 avg.
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	0.1 mg/L (ppm)	modified Winkler	110 avg.
pH	electronic pH tester	0.0-14.0 pH	0.1 pH	—	life of the meter
Salinity	titration	0-40 g/Kg	0.4 g/Kg	mercuric nitrate	110 avg.

OTHER INFORMATION Dimensions/Weight 440 x 330 x 100 mm (17.3 x 13.0 x 3.9")/2.3 kg (5.1 lbs.)

HI 3893 Aquarium Test Kit

Ammonia (as NH ₃ -N)	colorimetric	0.0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	Nessler	50
Nitrate (as NO ₃ ⁻ -N)	colorimetric	0-50 mg/L (ppm)	10 mg/L (ppm)	cadmium reduction	50
Nitrite (as NO ₂ ⁻ -N)	colorimetric	0.0-1.0 mg/L (ppm)	0.2 mg/L (ppm)	chromotropic acid	50
pH	colorimetric	6.0-8.5 pH	0.5 pH	pH indicator	50

OTHER INFORMATION Dimensions/Weight 370 x 270 x 80 mm (14.6 x 10.6 x 3.1")/840 g (1.9 lbs.)

ORDERING INFORMATION

HI 3823 test kit includes all reagents necessary to perform over 100 tests for each parameter, electronic pH tester, rigid carrying case, all needed accessories for tests and instruction manuals.

HI 3893 test kit includes all reagents necessary to perform over 100 tests for each parameter, rigid carrying case, all needed accessories for tests and instruction manuals.

ACCESSORIES

HI 3823

HI 3810-100 Replacement reagents set for 100 tests (Oxygen Dissolved)

HI 3811-100 Replacement reagents set for 100 tests (Alkalinity)

HI 3812-100 Replacement reagents set for 100 tests (Hardness)

HI 3818-100 Replacement reagents set for 100 tests (Carbon Dioxide)

HI 3835-100 Replacement reagents set for 100 tests (Salinity)

HI 70004P pH 4.01 buffer solution, for 25 calibrations in pH 4.01

HI 70007P pH 7.01 buffer solution, for 25 calibrations in pH 7.01

HI 70010P pH 10.01 buffer solution, for 25 calibrations in pH 10.01

HI 3893

HI 3826-025 Replacement reagent set for 25 tests (Ammonia)

HI 3873-100 Replacement reagent set for 100 tests (Nitrite)

HI 3874-100 Replacement reagent set for 100 tests (Nitrate)

HI 3881-100 Replacement kit for 100 tests (pH)

HI 3816 • HI 3827 • HI 3828 • HI 3837

Boiler and Feedwater Test Kits

Four Kits to Choose From!

For boiler and feedwater industries, choose the kit that best fits your application among any of our four combinations.

All the tests are performed with a titration method except for the pH test. pH is obtained with HANNA's pHep®, pH electronic tester which guarantees greater accuracy and a longer life than traditional litmus paper.

Every kit is equipped with all the necessary reagents and equipment to perform over 100 tests (50 each for iron and phosphate). All reagents can be purchased individually as they run out (please see our reagents section). All tests are easy to perform with step-by-step instructions.

Every kit is supplied with a rugged portable carrying case for orderly transportation.



HI 3837: kit for pH, phosphate and sulfite

ORDERING INFORMATION

HI 3816, HI 3827, HI 3828 and HI 3837 test kits include all of the necessary reagents and accessories to perform over 100 tests for every parameter, for the exception of iron and phosphate which include reagents for 50 tests each, hard carrying cases and instructions.

ACCESSORIES

HI 3811-100	Replacement reagents set for 100 tests (Alkalinity)
HI 3812-100	Replacement reagents set for 100 tests (Hardness)
HI 3815-100	Replacement reagents set for 100 tests (Chloride)
HI 3822-100	Replacement reagents set for 100 tests (Sulfite)
HI 3833-050	Replacement reagents set for 50 tests (Phosphate)
HI 3834-050	Replacement reagents set for 50 tests (Iron)
HI 70004P	pH 4.01 buffer solution, for 25 calibrations in pH 4.01
HI 70007P	pH 7.01 buffer solution, for 25 calibrations in pH 7.01
HI 70010P	pH 10.01 buffer solution, for 25 calibrations in pH 10.01



HI 3816: kit for alkalinity, chloride and hardness



HI 3827: kit for alkalinity, chloride, hardness, pH, phosphate and sulfite



HI 3828: kit for alkalinity, chloride, hardness, iron and pH

PARAMETER	METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS
HI 3816, HI 3827, HI 3828, HI 3837 Boiler Test Kits					
Alkalinity (as CaCO₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.
Chloride (as Cl⁻)	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	1 mg/L (ppm) 10 mg/L (ppm)	mercuric nitrate	110 avg.
Hardness (as CaCO₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	0.3 mg/L (ppm) 3 mg/L (ppm)	EDTA	100 avg.
Iron	colorimetric	0-5 mg/L (ppm)	1 mg/L (ppm)	phenanthroline	50
Phosphate (as PO₄³⁻)	colorimetric	0-5 mg/L (ppm)	1 mg/L (ppm)	ascorbic acid	50
pH	electronic pH tester	0.0-14.0 pH	0.1 pH	—	life of the meter
Sulfite (as Na₂SO₃)	titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	0.2 mg/L (ppm) 2 mg/L (ppm)	iodometric	110 avg.

OTHER INFORMATION

Dimensions HI 3816 and HI 3837: 370 x 270 x 80 mm; HI 3827 and HI 3828: 440 x 330 x 100 mm

Weight HI 3816: 1.2 kg (2.6 lbs.); HI 3827: 2.2 kg (4.9 lbs.); HI 3828: 2 kg (4.4 lbs.); HI 3837: 1.5 kg (3.3 lbs.)

Cooling and Boiler Test Kit



Boilers can be complicated systems to maintain. It seems easy enough that water heats to steam, and that steam provides power. For such a seemingly simplistic operation, care and maintenance can be anything but simple. Proper boiler treatment can prevent or correct a multitude of hazardous and costly situations.

Corrosion can occur in many key areas of a boiler. It can shorten the life of a boiler, or at the least, increase the costs associated with maintaining a boiler. Corrosion can form in feed water heaters, deaerators, superheater tubes and economizers, among other places. Corrosion is commonly caused by the presence of dissolved gases and low pH.

Corrosion can be debilitating to boiler operation, but it is preventable. In order to effectively prevent or control corrosion, a boiler treatment regimen should include the maintenance of pH levels as well as alkalinity. Together with proper operation, the right boiler treatment chemicals can ward off dangerous corrosion in the critical components of a boiler.

This guarantees the maximum efficiency of the system and prevents costly damage that can occur as a result of corrosion to metal parts

HANNA's HI 3821 combination test kit includes all the necessary reagents to test these parameters. The kit allows you to perform over 100 tests for each parameter (50 for phosphate). All reagent bottles are numerically labeled for ease of operation and will allow you to avoid mistakes.

ORDERING INFORMATION

HI 3821 test kit includes all of the necessary reagents and accessories to perform over 100 tests for every parameter, for the exception of phosphate which includes reagents for 50 tests each, hard carrying case and instructions.

ACCESSORIES

- HI 3810-100** Replacement reagents set for 100 tests (Oxygen Dissolved)
- HI 3811-100** Replacement reagents set for 100 tests (Alkalinity)
- HI 3812-100** Replacement reagents set for 100 tests (Hardness)
- HI 3815-100** Replacement reagents set for 100 tests (Chloride)
- HI 3822-100** Replacement reagents set for 100 tests (Sulfite)
- HI 3833-050** Replacement reagents set for 50 tests (Phosphate)

PARAMETER	METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS
HI 3821 Cooling and Boiler Combination Test Kit					
Alkalinity (as CaCO ₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.
Chloride	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	1 mg/L (ppm) 10 mg/L (ppm)	mercuric nitrate	110 avg.
Hardness (as CaCO ₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	0.3 mg/L (ppm) 3 mg/L (ppm)	EDTA	100 avg.
Phosphate	colorimetric	0-5 mg/L (ppm)	1 mg/L (ppm)	ascorbic acid	50 avg.
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	0.1 mg/L (ppm)	modified Winkler	110 avg.
Sulfite (as Na ₂ SO ₃)	titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	0.2 mg/L (ppm) 2 mg/L (ppm)	iodometric	110 avg.
OTHER INFORMATION					
Dimensions/ Weight 440 x 330 x 100 mm (17.3 x 13.0 x 3.9")/2.5 kg (5.5 lb.)					

HI 3814

Environmental Monitoring Test Kit

Ideal for Professionals and Students

The six most important parameters in environmental applications can be monitored with this combination chemical test kit. They include: acidity, alkalinity, carbon dioxide, dissolved oxygen, hardness and pH.

This kit is ideal not only for professionals, but also for students of Environmental Sciences since it offers great performance and ease of use.

HI 3814 is equipped with all the accessories and reagents to perform over 100 tests for each parameter.

The pHep®, our popular pH electronic tester, is included for your convenience. This small and easy to use pH meter will provide more accurate and reliable pH readings than conventional litmus paper. The pHep® also has the added benefit of introducing students to the use of a pH meter.

The kit is supplied complete with a step-by-step instruction manual and a hard carrying case to easily perform tests in the field.

Reagents can be replenished individually by parameter as they run out. (Please see our reagents section).



ORDERING INFORMATION

HI 3814 test kit includes all of the necessary reagents and accessories to perform over 100 tests for every parameter, electronic pH tester, hard carrying case and instructions.

ACCESSORIES

HI 3810-100	Replacement reagents set for 100 tests (Oxygen Dissolved)
HI 3811-100	Replacement reagents set for 100 tests (Alkalinity)
HI 3812-100	Replacement reagents set for 100 tests (Hardness)
HI 3818-100	Replacement reagents set for 100 tests (Carbon Dioxide)
HI 3820-100	Replacement reagents set for 100 tests (Acidity)
HI 70004P	pH 4.01 buffer solution, for 25 calibrations
HI 70007P	pH 7.01 buffer solution, for 25 calibrations
HI 70010P	pH 10.01 buffer solution, for 25 calibrations

PARAMETER	METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS
HI 3814 Environmental Monitoring Test Kit					
Acidity (as CaCO₃)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	1 mg/L (ppm) 5 mg/L (ppm)	methyl-orange/ phenolphthalein	110 avg.
Alkalinity (as CaCO₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.
Carbon Dioxide	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	0.1 mg/L (ppm) 0.5 mg/L (ppm) 1 mg/L (ppm)	phenolphthalein	110 avg.
Hardness (as CaCO₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	0.3 mg/L (ppm) 3 mg/L (ppm)	EDTA	100 avg.
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	0.1 mg/L (ppm)	modified Winkler	110 avg.
pH	electronic pH tester	0.0-14.0 pH	0.1 pH	—	life of the meter

OTHER INFORMATION Dimensions/ Weight 440 x 330 x 100 mm (17.3 x 13.0 x 3.9")/2.3 kg (5.1 lb.)


HI 3825 Combination Swimming Pool Test Kit

Organized for Daily Tests

Swimming pool water requires daily tests for alkalinity, bromine, chlorine and pH.

Chlorine and bromine, which kill microorganisms, are commonly used in swimming pool water because of their disinfectant properties.

Alkalinity and pH should be monitored because their concentration in pool water affects the proper activity of the disinfecting agents.

Bromine and chlorine tests are colorimetric (color comparison), while alkalinity tests are a titration. pH tests are performed with HANNA's pHep® pH tester. The pHep® offers greater accuracy and a wider range than litmus paper.

HANNA's Quick-check test kits combine two basic parameters in swimming pool monitoring. These kits are ideal for performing routine pH and chlorine testing.

HI 3825: Kit for alkalinity, bromine, chlorine and pH

HI 3887: Quick-check test kit for free chlorine and pH

HI 3888: Quick-check test kit for total chlorine and pH

PARAMETER	METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS
HI 3825 Combination Swimming Pool Test Kit					
Alkalinity (as CaCO₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.
Bromine	colorimetric	0.0-3.0 mg/L (ppm)	0.6 mg/L (ppm)	DPD	60 avg.
Chlorine	colorimetric	0.0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	DPD	50 avg.
pH	electronic pH tester	0.0-14.0 pH	0.1 pH	—	life of the meter

OTHER INFORMATION **Dimensions/Weight** 370 x 270 x 80 mm (14.6 x 10.6 x 3.1")/1.1 kg (2.4 lb.)

HI 3887, HI 3888 Quick-check Swimming Pool Test Kits

Free Chlorine	colorimetric	0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	DPD	50 avg.
Total Chlorine	colorimetric	0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	DPD	50 avg.
pH	colorimetric	6.0-8.5 pH	0.5 pH	pH indicator	100 avg.

OTHER INFORMATION **WEIGHT** HI 3887: 170 g (6.0 oz.); HI 3888: 190 g (6.7 oz)

ORDERING INFORMATION

HI 3825, HI 3887 and HI 3888 test kits include all of the necessary reagents and accessories to perform tests for every parameter, hard carrying cases and instructions.

ACCESSORIES

HI 3811-100	Replacement reagents set for 100 tests (Alkalinity)
HI 3830-060	Replacement reagents set for 60 tests (Bromine)
HI 3831F-050	Replacement reagents set for 50 tests (Free Chlorine)
HI 3831T-050	Replacement reagents set for 50 tests (Total Chlorine)
HI 70004P	pH 4.01 buffer solution, for 25 calibrations
HI 70007P	pH 7.01 buffer solution, for 25 calibrations
HI 70010P	pH 10.01 buffer solution, for 25 calibrations

HI 3817

Water Quality Test Kit

Accurate and Reliable Water Quality Tests

Monitor the most important chemical parameters in water: alkalinity, chloride, hardness, iron, pH and sulfite with this combination test kit.

The kit has all the reagents needed to perform over 100 tests for each parameter (50 tests for iron). Reagents may also be purchased individually as they run out. (please see our reagent section for a complete listing).

pH measurements are performed with our electronic pHep® pH tester which guarantees more accurate and repeatable readings than litmus paper.

The chemical reagents to perform each test are provided in numerically labeled bottles and are easy to identify. All titration reagents are standardized, and do not require chemical handling to perform the analysis.

The kit is supplied with a convenient hard carrying case, designed with field applications in mind. It will also keep your test kit neat and organized.

The HANNA HI 3817 combination test kit offers all the necessary equipment for accurate and reliable water quality testing.



ORDERING INFORMATION

HI 3817 test kit includes all of the necessary reagents and accessories to perform over 100 tests for every parameter, for the exception of iron which include reagents for 50 tests, electronic pH tester, hard carrying case and instructions.

ACCESSORIES

HI 3811-100	Replacement reagents set for 100 tests (Alkalinity)
HI 3812-100	Replacement reagents set for 100 tests (Hardness)
HI 3815-100	Replacement reagents set for 100 tests (Chloride)
HI 3822-100	Replacement reagents set for 100 tests (Sulfite)
HI 3834-050	Replacement reagents set for 50 tests (Iron)
HI 70004P	pH 4.01 buffer solution, for 25 calibrations
HI 70007P	pH 7.01 buffer solution, for 25 calibrations
HI 70010P	pH 10.01 buffer solution, for 25 calibrations

PARAMETER	METHOD	RANGE	SMALLEST INCREMENT	CHEMICAL METHOD	# TESTS
HI 3817 Water Quality Test Kit					
Alkalinity (as CaCO₃)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.
Chloride	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	1 mg/L (ppm) 10 mg/L (ppm)	mercuric nitrate	110 avg.
Hardness (as CaCO₃)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	0.3 mg/L (ppm) 3 mg/L (ppm)	EDTA	100 avg.
Iron	colorimetric	0-5 mg/L (ppm)	1 mg/L (ppm)	phenanthroline	50
pH	electronic pH tester	0.0-14.0 pH	0.1 pH	–	life of the meter
Sulfite (as Na₂SO₃)	titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	0.2 mg/L (ppm) 2 mg/L (ppm)	iodometric	110 avg.
OTHER INFORMATION	Dimensions/ Weight 440 x 330 x 100 mm (17.3 x 13.0 x 3.9")/2.1 kg (4.6 lb.)				



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Test kits can
be replaced
individually

Backpack Lab™ Water Quality Educational Test Kit

Learn about environmental water parameters right from the source!

HANNA offers a series of test kits specifically designed for educators and Environmental Science students. These portable kits contain well constructed lessons and activities, and will allow the teacher to get the most out of their classroom time.

Backpack Lab™ is designed with all the necessary components in one place, reducing the chance of misplacing an item. Ideal for transporting, take this durable backpack to the field for on-site measurements.

The lesson plan and components are tied together by a comprehensive teacher's manual that includes information about each parameter, classroom activities designed to introduce students to each parameter, and detailed field testing procedures. HANNA chemical test kits and pocket testers provide teachers with a valuable tool in helping students assess the water quality of streams, rivers and lakes.

Backpack Lab™ Water Quality Education Test Kit Includes:

- 110 tests each for acidity & alkalinity, 100 tests for carbon dioxide, dissolved oxygen, hardness, nitrate & phosphate
- HANNA's pHep®4 waterproof pH/temperature tester
- HANNA's DiST®5 waterproof conductivity/total dissolved solids (TDS) tester
- Secchi disk for turbidity
- Backpack carrying case which holds all components of the kit
- 72-page teachers manual with a curriculum that meets National Science Teachers Association Standards
- Parameter summary in pdf and powerpoint format (on included CD).
- Laminated, laboratory instruction cards with step-by-step field test procedures
- Reproducible lab activity worksheets with instructions, goals, hypothesis, and testing procedure results/ observations
- A glossary of key terms in pdf format (on included CD).

ORDERING INFORMATION

HI 3817BP Backpack Lab includes pHep®4 pocket pH tester, DiST®5 EC/TDS/temperature meter, set of 10 field test procedures, vocabulary terms blackline master, set of 10 parameter summary transparencies, set of 10 lab activity worksheets, acidity test kit, alkalinity test kit, carbon dioxide test kit, dissolved oxygen test kit, hardness test kit, nitrate test kit, phosphate test kit and backpack.

ACCESSORIES

- HI 3810-100 Replacement reagents set for 100 tests (Oxygen Dissolved)
- HI 3811-100 Replacement reagents set for 100 tests (Alkalinity)
- HI 3812-100 Replacement reagents set for 100 tests (Hardness)
- HI 3818-100 Replacement reagents set for 100 tests (Carbon Dioxide)
- HI 3820-100 Replacement reagents set for 100 tests (Acidity)
- HI 3833-050 Replacement reagents set for 50 tests (Phosphate)
- HI 3874-100 Replacement reagent set for 100 tests (Nitrate)
- HI 70004P pH 4.01 buffer solution, for 25 calibrations
- HI 70007P pH 7.01 buffer solution, for 25 calibrations
- HI 70010P pH 10.01 buffer solution, for 25 calibrations
- HI 70031P 1413 µS/cm EC calibration standard, for 25 calibrations
- HI 70039P 5000 µS/cm EC calibration standard, for 25 calibrations

PARAMETER	REORDER CODE	METHOD	RANGE	CHEMICAL METHOD	# TESTS
HI 3817BP Backpack Lab™ Water Quality Educational Test Kit					
Acidity (CaCO ₃)	HI 3820	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	methyl-orange phenolphthalein	110
Alkalinity (CaCO ₃) Phenolphthalein & Total	HI 3811	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	phenolphthalein/ bromphenol blue	110
Carbon Dioxide	HI 3818	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	phenolphthalein	110
Oxygen, Dissolved	HI 3810	titration	0.0-10.0 mg/L (ppm)	modified Winkler	110
Hardness (CaCO ₃)	HI 3812	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	EDTA	100
Nitrate (NO ₃ ⁻ -N)	HI 3874	colorimetric	0-50 mg/L (ppm)	cadmium reduction	100
Phosphate	HI 3833	colorimetric	0-5 mg/L (ppm)	ascorbic acid	50

Backpack Lab™ contents subject to change

HI 3896BP

Backpack Lab™ Soil Quality Educational Test Kit

A complete, portable learning experience

HANNA introduces a kit specifically assembled for the educator and Environmental Science student. Using the popular HANNA Agricultural Combination Test Kit (HI 3895 and HI 3896) as its foundation, the Soil Quality Education Test Kit is designed to provide a complete lesson plan for teachers. Teachers are able to introduce students to important chemical tests for evaluating soil quality and fertility, and relate these measurements to the principles of plant metabolism. Tied together by an extensive teacher's guide, this kit includes in-depth background information about each parameter, classroom activities designed to introduce students to each parameter and detailed field-testing procedures.

The HANNA Agricultural Combination Test Kit addresses important issues related to soil quality and modern agriculture practices. Real-world examples help students understand the relevance of macronutrients and other parameters in everyday life. This kit introduces the student to all major soil quality topics, and is presented in an easy to use format that makes lessons accessible, understandable and memorable.



ORDERING INFORMATION

HI 3817BP Backpack Lab test kit includes agriculture test kit pro (enough for 100 NPK tests), pHep®4 meter, DiST®5 meter, HI 145 digital thermometer, set of 6 parameter summary transparencies, set of 6 field test procedures, set of 6 lab activity worksheets, vocabulary terms blackline master and backpack

Test kits can be replaced individually



Backpack Lab™ Soil Quality Education Test Kit Includes:

- Agriculture combination test kit for testing nitrogen, phosphorus, potassium (N,P,K) with enough materials for 50 tests of each parameter
- HANNA's pHep®4 waterproof pH/temperature tester
- HANNA's DiST®5 waterproof conductivity/total dissolved solids (TDS) tester
- HANNA's HI 145 digital thermometer
- Backpack carrying case which holds all components of the kit
- 48-page teachers manual with a curriculum that meets National Science Teachers Association Standards
- Parameter summary in pdf and powerpoint format (on included CD).
- Laminated, laboratory instruction cards with step-by-step field test procedures
- Reproducible lab activity worksheets with instructions, goals, hypothesis and testing procedure results/ observations
- A glossary of key terms in pdf format (on included CD).

PARAMETER	REORDER CODE	METHOD	RANGE	CHEMICAL METHOD	# TESTS
HI 3896BP Backpack Lab™ Soil Quality Educational Test Kit					
Nitrogen	HI 3896	colorimetric	traces, low, medium, high	Ned	50
Phosphorus	HI 3896	colorimetric	traces, low, medium, high	ascorbic acid	50
Potassium	HI 3896	turbidimetric	traces, low, medium, high	tetraphenylborate	50
pH	HI 3896	colorimetric	4 to 9 pH (1 pH increments)	pH indicators	50

Backpack Lab™ contents subject to change



backpacklab.com



Test kits can be replaced individually

Backpack Lab™ Marine Science Educational Test Kit

Everything students need to know about marine science parameters all in one backpack!

Backpack Lab™ is designed with all the necessary components in one place, reducing the chance of misplacing an item. Ideal for transporting, take this durable backpack to the field for on-site measurements.

This kit is designed to provide a complete unit for teachers to introduce students to important marine science topics. The teacher's guide provides detailed background information for marine science lessons/activities that can be adapted to various grade levels. Field tests are included to complement classroom lessons. All materials fit easily into the supplied backpack for convenient transport.

Backpack Lab™ Includes:

- 110 tests each for Acidity and Alkalinity, 100 tests for ammonia, carbon dioxide, dissolved oxygen, hardness, nitrate, nitrogen, phosphate and salinity.
- HANNA's pHeP®4 waterproof pH/temperature tester
- HANNA's DiST®5 waterproof conductivity/ Total Dissolved Solids (TDS) tester
- Hydrometer for salinity
- Secchi disk for turbidity
- Backpack-style carrying case which holds all components of the kit
- 118-page teachers manual with a curriculum that meets National Science Teachers Standards
- Parameter summary in pdf and powerpoint format (on included CD).
- Laminated, laboratory instruction cards with step-by-step field-test procedures
- Reproducible lab activity worksheets with instructions, goals, hypothesis, and testing procedure results/ observations
- A glossary of key terms in pdf format (on included CD).

ORDERING INFORMATION

HI 3899BP Backpack Lab includes acidity test kit, alkalinity test kit, carbon dioxide test kit, ammonia test kit, dissolved oxygen test kit, nitrate test kit, nitrite test kit, phosphate test kit, salinity test kit, secchi disc, hydrometer, pHeP®4 pocket pH tester, DiST®6 EC/TDS/temperature meter, set of 6 field test procedure, vocabulary terms blackline master, set of 6 parameter summary transparencies, set of 6 lab activity worksheets and backpack.

ACCESSORIES

- HI 3810-100 Replacement reagents set for 100 tests (Oxygen Dissolved)
- HI 3811-100 Replacement reagents set for 100 tests (Alkalinity)
- HI 3818-100 Replacement reagents set for 100 tests (Carbon Dioxide)
- HI 3820-100 Replacement reagents set for 100 tests (Acidity)
- HI 3826-025 Replacement reagents set for 25 tests (Ammonia)
- HI 3833-050 Replacement reagents set for 50 tests (Phosphate)
- HI 3835-100 Replacement reagents set for 100 tests (Salinity)
- HI 3873-100 Replacement reagents set for 100 tests (Nitrite)
- HI 3874-100 Replacement reagent set for 100 tests (Nitrate)
- HI 70004P pH 4.01 buffer solution, for 25 calibrations
- HI 70007P pH 7.01 buffer solution, for 25 calibrations
- HI 70010P pH 10.01 buffer solution, for 25 calibrations
- HI 70031P 1413 µS/cm EC calibration standard, for 25 calibrations
- HI 70039P 5000 µS/cm EC calibration standard, for 25 calibrations

PARAMETER	REORDER CODE	METHOD	RANGE	CHEMICAL METHOD	# TESTS
HI 3899BP Backpack Lab™ Water Quality Educational Test Kit					
Acidity (CaCO ₃)	HI 3820	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	Methyl-orange Phenolphthalein	110
Alkalinity (CaCO ₃) Phenolphthalein & Total	HI 3811	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	Phenolphthalein/ Bromphenol blue	110
Ammonia (as NH ₃ -N) in salt water	HI 3826	colorimetric	0.0-2.5 mg/L (ppm)	Nessler	25 avg.
Carbon Dioxide	HI 3818	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	Phenolphthalein	110
Oxygen, Dissolved	HI 3810	titration	0.0-10.0 mg/L (ppm)	Modified Winkler	110
Nitrite	HI 3873	colorimetric	0.0-1.0 mg/L (ppm)	Chromotropic acid	100
Nitrate (NO ₃ ⁻ -N)	HI 3873	colorimetric	0-50 mg/L (ppm)	Cadmium reduction	100
Phosphate	HI 3833	colorimetric	0-5 mg/L (ppm)	Ascorbic acid	50
Salinity	HI 3835	titration	0.0-40.0 g/kg	Mercuric nitrate	110

Backpack Lab™ contents subject to change

Checker®HC Reagents and Calibration Check Sets

CODE	PARAMETER	CHEMICAL METHOD	REAGENT CODE	CALIBRATION CHECKING SET	# OF TESTS
HI 701	Chlorine, Free	DPD	HI 701-25	HI 701-11	25
HI 706	Phosphorus HR	Amino Acid	HI 706-25	HI 706-11	40
HI 711	Chlorine, Total	DPD	HI 711-25	HI 711-11	25
HI 713	Phosphate LR	Ascorbic Acid	HI 713-25	HI 713-11	25
HI 717	Phosphate HR	Amino Acid	HI 717-25	HI 717-11	40
HI 718	Iodine	DPD	HI 718-25	HI 718-11	25
HI 721	Iron HR	Phenantroline	HI 721-25	HI 721-11	25
HI 723	Chromium VI, HR	Diphenylcarbohydrazide	HI 723-25	HI 723-11	25
HI 726	Nickel HR	EDTA	HI 726-25	HI 726-11	25
HI 727	Color of Water	Platinum Cobalt	–	HI 727-11	–
HI 729	Fluoride LR	SPADNS	HI 729-26	HI 729-11	25
HI 736	Phosphorus ULR	Ascorbic Acid	HI 736-25	HI 736-11	25
HI 739	Fluoride HR	SPADNS	HI 739-26	HI 739-11	25
HI 755	Alkalinity	Colorimetric	HI 755-26	HI 755-11	25
HI 764	Nitrite ULR	Diazotization	HI 764-25	HI 764-11	25
HI 770	Silica HR	Molybdate	HI 770-25	HI 770-11	25

Tips for an accurate measurement

- It is important that the sample does not contain any debris.
- Whenever the cuvette is placed into the measurement cell, it must be dry outside, and completely free of fingerprints, oil or dirt. Wipe it thoroughly with HI 731318 or a lint-free cloth prior to insertion.
- Shaking the cuvette can generate bubbles, causing higher readings. To obtain accurate measurements, remove such bubbles by swirling or by gently tapping the cuvette.
- Do not let the reacted sample stand for too long after reagent is added, or accuracy will be lost.
- After the reading it is important to discard the sample immediately, otherwise the glass might become permanently stained.



Chemical Test Kit Reagents

Single Parameter



HANNA CHECKER® HC SERIES AND CHEMICAL TEST KITS

CODE	TEST KIT PARAMETER	CHEMICAL METHOD	REAGENT CODE	# TESTS
HI 38000	Sulfate	barium chloride	HI 38000-10	100
HI 38001	Sulfate LR/HR	barium chloride	HI 38001-10	200
HI 38013	Alkalinity, Phenolphthalein and total	phenolphthalein bromine phenol blue	HI 38013-100	200
HI 38014	Alkalinity (CaCO ₃)	acid titration	HI 38014-100	100
HI 38015	Chloride, extended range	silver nitrate titration	HI 38015-100	100
HI 38016	Chlorine, total, MR	DPD colorimetric	HI 38016-100	100
HI 38017	Chlorine, free and total, LR/MR	DPD colorimetric	HI 38017-200	200
HI 38018	Chlorine, free, LR/MR	DPD colorimetric	HI 38018-200	200
HI 38019	Chlorine, total, LR/MR	DPD colorimetric	HI 38019-200	200
HI 38020	Chlorine, free and total, LR/MR/HR	DPD colorimetric	HI 38020-200	200
HI 38022	Chlorine, total, HR	iodometric	HI 38022-100	100
HI 38023	Chlorine, total, extended range	iodometric	HI 38023-100	100
HI 38033	Hardness, total (CaCO ₃)	EDTA titration	HI 38033-100	100
HI 38034	Hardness, total (CaCO ₃)	EDTA titration	HI 38034-200	200
HI 38035	Hardness, (total and calcium)	EDTA titration	HI 38035-200	200
HI 38039	Iron LR	phenanthroline colorimetric	HI 38039-100	100
HI 38040	Iron MR	phenanthroline colorimetric	HI 38040-100	100
HI 38041	Iron HR	phenanthroline colorimetric	HI 38041-100	100
HI 38042	Manganese LR	sodium periodate	HI 38042-100	100
HI 38049	Ammonia (fresh water) (NH ₃ -N)	nessler colorimetric	HI 38049-100	100
HI 38050	Nitrate (soil + irrigation) (NO ₃ ⁻ -N)	cadmium reduction	HI 38050-200	200
HI 38051	Nitrite (NO ₂ ⁻ -N)	chromotropic acid	HI 38051-100	100
HI 38054	Ozone	DPD	HI 38054-100	100
HI 38058	pH	pH indicator	HI 38058-100	300
HI 38061	Phosphate	ascorbic acid	HI 38061-100	100
HI 38067	Silica HR (SiO ₂)	heteropoly blue	HI 38067-100	100
HI 38066	Silica LR (SiO ₂)	heteropoly blue	HI 38066-100	100
HI 38072	Manganese (irrigation water)	sodium periodate	HI 38072-100	100
HI 38073	Phosphorus (soil)	colorimetric	HI 38073-100	100
HI 38074	Boron	boric acid	HI 38074-100	100
HI 38075	Copper	bicinchoninic bicinchoninate	HI 38075-100	100
HI 38076	Zinc, extended range	zincon	HI 38076-100	100
HI 38077	Phosphate (irrigation water)	ascorbic acid	HI 38077-100	100
HI 38078	SAR	EDTA titration	HI 38078-100	100
HI 38079	Magnesium (irrigation water)	EDTA	HI 38079-100	100
HI 38080	Calcium and Magnesium (soil)	EDTA	HI 38080-100	100
HI 38081	Calcium and Magnesium (irrigation water)	EDTA	HI 38081-100	100
HI 38082	Potassium (soil)	turbidimetric	HI 38082-100	100
HI 38083	Sodium, exchangeable (EES) & gypsum requirement (GR)	calcium sulfate	HI 38083-100	100
HI 38084	Acidity, total exchangeable meq/100 g	potassium chloride	HI 38084	100
HI 38086	Calcium (irrigation water)	turbidimetric	HI 38086-100	100



Multiparameter

Chemical Test Kit Reagents

CODE	TEST KIT PARAMETER	CHEMICAL METHOD	REAGENT CODE	# TESTS
HI 3810	Dissolved Oxygen	Winkler	HI 3810-100	110
HI 3811	Alkalinity (CaCO ₃)	acid titration	HI 3811-100	110
HI 3812	Hardness, total (CaCO ₃)	EDTA titration	HI 3812-100	100
HI 3813	Alkalinity (as CaCO ₃)	phenolphthalein/bromphenol blue	HI 3811-100	110 avg.
	Acidity (as CaCO ₃)	methyl orange	HI 3820-100	110
HI 3814	Dissolved Oxygen	Winkler	HI 3810-100	110
	Alkalinity (as CaCO ₃)	phenolphthalein/bromphenol blue	HI 3811-100	110 avg.
	Hardness (as CaCO ₃)	EDTA	HI 3812-100	100 avg.
	Carbon Dioxide	base titration	HI 3818-100	110
	Acidity (as CaCO ₃)	methyl-orange/phenolphthalein	HI 3820-100	110
HI 3815	Chloride	mercury nitrate titration	HI 3815-100	110
HI 3816	Alkalinity (as CaCO ₃)	phenolphthalein/bromphenol blue	HI 3811-100	110 avg.
	Chloride	mercury nitrate titration	HI 3815-100	110
	Hardness (as CaCO ₃)	EDTA	HI 3812-100	100 avg.
HI 3817	Alkalinity (as CaCO ₃)	phenolphthalein/bromphenol blue	HI 3811-100	110 avg.
	Hardness (as CaCO ₃)	EDTA	HI 3812-100	100 avg.
	Chloride	mercury nitrate titration	HI 3815-100	110
	Sulfite (Na ₂ SO ₃)	titration	HI 3822-100	110
	Iron	phenanthroline colorimetric	HI 3834-050	50
	Buffer solution	–	HI 70004P	25
	Buffer solution	–	HI 70007P	25
	Buffer solution	–	HI 70010P	25
HI 3817BP	Dissolved Oxygen	Winkler	HI 3810-100	110
	Alkalinity (as CaCO ₃)	phenolphthalein/bromphenol blue	HI 3811-100	110 avg.
	Hardness, total (CaCO ₃)	EDTA titration	HI 3812-100	100
	Carbon Dioxide	base titration	HI 3818-100	110
	Acidity (as CaCO ₃)	methyl orange	HI 3820-100	110
	Phosphate	ascorbic acid	HI 3833-050	50
	Nitrate (NO ₃ ⁻ -N)	cadmium reduction	HI 3874-100	100
	Buffer solution	–	HI 70004P	25
	Buffer solution	–	HI 70007P	25
	Buffer solution	–	HI 70010P	25
	EC Calibration Standard	–	HI 70031P	25
	EC Calibration Standard	–	HI 70033P	25
HI 3818	Carbon Dioxide	base titration	HI 3818-100	110
HI 3819	Alkalinity (as CaCO ₃)	phenolphthalein/bromphenol blue	HI 3811-100	110 avg.
	Acidity (as CaCO ₃)	methyl orange	HI 3820-100	110
	Iron	phenanthroline colorimetric	HI 3834-050	50
	Buffer solution	–	HI 70004P	25
	Buffer solution	–	HI 70007P	25
	Buffer solution	–	HI 70010P	25
HI 3820	Acidity (as CaCO ₃)	methyl orange	HI 3820-100	110
HI 3821	Dissolved Oxygen	Winkler	HI 3810-100	110

Chemical Test Kit Reagents

Multiparameter



HANNA CHECKER®HC SERIES AND CHEMICAL TEST KITS

CODE	TEST KIT PARAMETER	CHEMICAL METHOD	REAGENT CODE	# TESTS
HI 3821	Alkalinity (as CaCO ₃)	phenolphthalein/bromphenol blue	HI 3811-100	110 avg.
	Hardness, total (CaCO ₃)	EDTA titration	HI 3812-100	100
	Chloride	mercury nitrate titration	HI 3815-100	110
	Sulfite (Na ₂ SO ₃)	titration	HI 3822-100	110
	Phosphate	ascorbic acid	HI 3833-050	50
HI 3822	Sulfite (Na ₂ SO ₃)	titration	HI 3822-100	110
HI 3823	Dissolved Oxygen	Winkler	HI 3810-100	110
	Alkalinity (as CaCO ₃)	phenolphthalein/bromphenol blue	HI 3811-100	110 avg.
	Hardness, total (CaCO ₃)	EDTA titration	HI 3812-100	100
	Carbon Dioxide	base titration	HI 3818-100	110
	Salinity (g/Kg)	mercuric nitrate titration	HI 3835-100	110
	Buffer solution	–	HI 70004P	25
	Buffer solution	–	HI 70007P	25
	Buffer solution	–	HI 70010P	25
HI 3824	Ammonia (fresh water) (NH ₃ -N)	nessler colorimetric	HI 3824-025	25
HI 3825	Alkalinity (as CaCO ₃)	phenolphthalein/bromphenol blue	HI 3811-100	110 avg.
	Bromine	DPD colorimetric	HI 3830-060	60
	Chlorine, free	DPD colorimetric	HI 3831F-050	50
	Chlorine, total	DPD colorimetric	HI 3831T-050	50
	Buffer solution	–	HI 70004P	25
	Buffer solution	–	HI 70007P	25
	Buffer solution	–	HI 70010P	25
HI 3826	Ammonia (sea water) (NH ₃ -N)	nessler colorimetric	HI 3826-025	25
HI 3827	Alkalinity (CaCO ₃)	acid titration	HI 3811-100	110
	Hardness, total (CaCO ₃)	EDTA titration	HI 3812-100	100
	Chloride	mercury nitrate titration	HI 3815-100	110
	Sulfite (Na ₂ SO ₃)	titration	HI 3822-100	110
	Phosphate	ascorbic acid	HI 3834-050	50
	Buffer solution	–	HI 70004P	25
	Buffer solution	–	HI 70007P	25
HI 3828	Alkalinity (CaCO ₃)	acid titration	HI 3811-100	110
	Hardness, total (CaCO ₃)	EDTA titration	HI 3812-100	100
	Chloride	mercury nitrate titration	HI 3815-100	110
	Iron	phenanthroline colorimetric	HI 3834-050	50
	Buffer solution	–	HI 70004P	25
	Buffer solution	–	HI 70007P	25
	Buffer solution	–	HI 70010P	25
HI 3829F	Chlorine, free	DPD colorimetric	HI 3829F-050	50
HI 3830	Bromine	DPD colorimetric	HI 3830-060	60
HI 3831F/HI 3831F/S	Chlorine, free	DPD colorimetric	HI 3831F-050	50
HI 3831T/HI 3831T/S	Chlorine, total	DPD colorimetric	HI 3831T-050	50
HI 3832	Iodine	DPD colorimetric	HI 3832-050	50
HI 3833	Phosphate	ascorbic acid	HI 3833-050	50
HI 3835	Salinity (g/Kg)	mercuric nitrate titration	HI 3835-100	110



Chemical Test Kit Reagents

CODE	TEST KIT PARAMETER	CHEMICAL METHOD	REAGENT CODE	# TESTS
HI 3837	Sulfite (Na_2SO_3)	titration	HI 3822-100	110
	Phosphate	ascorbic acid	HI 3833-050	50
	Buffer solution	–	HI 70004P	25
	Buffer solution	–	HI 70007P	25
	Buffer solution	–	HI 70010P	25
HI 3838	Formaldehyde	acid titration	HI 3838-100	110
HI 3839	Hydroxide	acid titration	HI 3839-100	110
HI 3840	Hardness LR (as CaCO_3)	EDTA titration	HI 3840-0.50	50
HI 3841	Hardness MR (as CaCO_3)	EDTA titration	HI 3841-050	50
HI 3842	Hardness HR (as CaCO_3)	EDTA titration	HI 3842-050	50
HI 3843	Hypochlorite (bleach)	iodometric	HI 3843-100	100
HI 3844	Hydrogen Peroxide	iodometric	HI 3844-100	100
HI 3845	Chromium VI MR/HR	iodometric	HI 3845-100	100
HI 3846	Chromium VI	diphenylcarbohydrazide	HI 3846-100	100
HI 3847	Copper	bicinchoninic	HI 3847-100	100
HI 3849	Hydrazine	p-dimethylaminobenzaldehyde	HI 3849-100	100
HI 3850	Ascorbic Acid	iodometric	HI 3850-100	100
HI 3851	Cyanuric Acid	turbidimetric	HI 3851-100	100
HI 3854	Zinc	colorimetric	HI 3854-100	100
HI 3855	Cyanide	pyridine-pyrazolone	HI 3855-100	100
HI 3856	Copper ULR (Cu LR)	bicinchoninate	HI 3856-100	100
HI 3857	Detergents (ABS/LAS)	metilene blue	HI 3857-035	35
HI 3859	Glycol (ppm)	oxidation	HI 3859-025	25
HI 3864	Phenols (ppm)	aminoantipyrine	HI 3864-100	100
HI 3873	Nitrite (NO_2^- -N)	chromotropic acid	HI 3873-100	100
HI 3874	Nitrate (NO_3^- -N)	cadmium reduction	HI 3874-100	100
HI 3875	Chlorine, free, MR	DPD colorimetric	HI 3875-100	100
HI 3879	Iodine	DPD colorimetric	HI 3879-100	100
HI 3880/HI 3880/0	pH	pH indicator	HI 3880-100	100
HI 3881	pH	pH indicator	HI 3881-100	100
HI 3881-5	pH	pH indicator	HI 3881-5	500
HI 3882	pH	pH indicator	HI 3882-200	200
HI 3886	pH	pH indicator	HI 3886-100	100

CODE	TEST KIT PARAMETER	CHEMICAL METHOD	REAGENT CODE	# TESTS
HI 3887	Chlorine, free	DPD colorimetric	HI 3831F-050	50
	pH + Dechlorinating Agent	pH indicator	HI 3881-010	100
	pH	pH indicator	HI 3881-100	100
HI 3888	Chlorine, total	DPD colorimetric	HI 3831T-050	50
	pH + Dechlorinating Agent	pH indicator	HI 3881-010	100
	pH	pH indicator	HI 3881-100	100
HI 3889	Iron	phenanthroline colorimetric	HI 3834-050	50
	Hardness MR (as CaCO ₃)	titration	HI 3841	50
HI 3893	Ammonia (sea water) (NH ₃ -N)	nessler colorimetric	HI 3826-025	25
	Nitrite (NO ₂ ⁻ -N)	chromotropic acid	HI 3873-100	100
	Nitrate (NO ₃ ⁻ -N)	cadmium reduction	HI 3874-100	100
	pH	pH indicator	HI 3881-100	100
HI 3895	Nitrogen	Ned	HI 3895-010	10
	Phosphorus	ascorbic acid	HI 3895-010	10
	Potassium	tetraphenylborate	HI 3895-010	10
	pH	pH indicators	HI 3895-010	10
HI 3896	Nitrogen	Ned	HI 3896-025	25
	Phosphorus	ascorbic acid	HI 3896-025	25
	Potassium	tetraphenylborate	HI 3896-025	25
	pH	pH indicators	HI 3896-025	25
HI 3896BP	Nitrogen	Ned	HI 3896-025	25
	Phosphorus	ascorbic acid	HI 3896-025	25
	Potassium	tetraphenylborate	HI 3896-025	25
	pH	pH indicators	HI 3896-025	25
	Buffer solution	-	HI 70004P	25
	Buffer solution	-	HI 70007P	25
	Buffer solution	-	HI 70010P	25
	EC Calibration Standard	-	HI 70031P	25
	EC Calibration Standard	-	HI 70033P	25
HI 3897	Acidity, olive oil	titration with hydroxide	HI 3897-010	10
HI 3898	Chloride, absence/presence	silver nitrate titration	HI 3898	100
HI 3899BP	Dissolved Oxygen	Winkler	HI 3810-100	110
	Alkalinity (as CaCO ₃)	phenolphthalein/bromphenol blue	HI 3811-100	110 avg.
	Carbon Dioxide	base titration	HI 3818-100	110
	Acidity (as CaCO ₃)	methyl-orange/phenolphthalein	HI 3820-100	110
	Ammonia (sea water) (NH ₃ -N)	nessler colorimetric	HI 3826-025	25
	Phosphate	ascorbic acid	HI 3833-050	50
	Salinity (g/Kg)	mercuric nitrate titration	HI 3835-100	110
	Nitrite (NO ₂ ⁻ -N)	chromotropic acid	HI 3873-100	100
	Nitrate (NO ₃ ⁻ -N)	cadmium reduction	HI 3874-100	100
	Buffer solution	-	HI 70004P	25
	Buffer solution	-	HI 70007P	25
	Buffer solution	-	HI 70010P	25
	EC Calibration Standard	-	HI 70031P	25
	EC Calibration Standard	-	HI 70033P	25

Accessories

Checker®HC Accessories

HI 740142	1 mL graduated syringe
HI 740028	1.5 V AAA batteries (6)
HI 731318	Cloth for wiping cuvettes (4)
HI 731321	Glass cuvettes (4)
HI 731225	Cuvette cap for Checker®HC (5)
HI 93703-50	Cuvette cleaning solutions
HI 93703-54	Dried resin 100 g
HI 740230	230 mL demineralized water
HI 740227	Filter assembly
HI 740228	Filter discs (100)
HI 740226	5 mL graduated syringe
HI 740157	Plastic refilling pipette (20)
HI 740146	Pipette tip (6)
HI 740143	1 mL graduated syringe (6)
HI 740036	100 mL plastic beaker (6)
HI 740034	Cap for 100 mL beaker

Chemical Test Kit Accessories

HI 3824-99	Color cube for ammonia test kit
HI 3830-99	Color cube for bromine test kit
HI 3831-99	Color cube for chlorine test kit
HI 3832-99	Color cube for iodine test kit
HI 3833-99	Color cube for phosphate test kit
HI 3834-99	Color cube for iron test kit
HI 3874-99	Color cube for nitrate test kit
HI 740098	Carrying case for HI 3813
HI 740099	Carrying case for HI 3814
HI 740100	Carrying case for HI 3816
HI 740101	Carrying case for HI 3817
HI 740102	Carrying case for HI 3819
HI 740103	Carrying case for HI 3821
HI 740104	Carrying case for HI 3823
HI 740105	Carrying case for HI 3825
HI 740106	Carrying case for HI 3827
HI 740107	Carrying case for HI 3828
HI 740108	Carrying case for HI 3837
HI 740051P	Scissors (10)
HI 740115	Carrying case for HI 3835
HI 740132P	Spoon for dosing (10)
HI 740133	Spoon for dosing (6)

Other Recommendations

Before using these products, make sure that they are entirely suitable for your specific application and for the environment in where they are used.

Operation of these instruments may cause unacceptable interferences to other electronic equipment, thus requiring the operator to take all necessary steps to eliminate interferences.

Any variation introduced by the user to the supplied equipment may degrade the instrument's performance.

To avoid damage or burns, do not put the instrument in the microwave oven. For your safety do not use or store the instrument in hazardous environments.

Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

For additional information, contact your dealer or the nearest HANNA Customer Service Center.

To find the HANNA Office in your area, visit our web site, www.hannainst.com



HI 3833-99



HI 3834-99