KENTUCKY WATERSHED WATCH
FIELD WATER CHEMISTRY ASSESSMENT

Standard Operating Procedure
WWSOP01000
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Division of Water

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Scope and Applicability

This document has been developed by the Kentucky Division of Water (KDOW) Water Watch Program as guidance for Watershed Watch Volunteers (or as required for 319 monitoring projects in Kentucky). This document describes procedures used for the uniform and accurate collection, field processing, field handling, and quality assurance/quality control (QA/QC) of water chemistry samples collected from the waters of Kentucky. The methods defined herein are required for field water chemistry assessment, field processing and field handling. These methods and procedures must be followed to ensure the accuracy and quality of the data.

Health & Safety Warnings

- During high flow, sampling should be postponed until baseline conditions exist. When these specific events are targeted, sampling crews shall use best professional judgment to obtain samples (i.e., postponement, high flow equipment, etc.). Be aware that any fast-flowing water can be unsafe. Do not sample if stream is at flood stage. The sampler's safety is the first priority.
- Waders and specialized wading boots should be utilized when conducting instream sampling, in order to remain dry, but also to provide a barrier from potential in-stream contaminants, and natural irritants (e.g., biting

insects, poison ivy). It is recommended that a wading belt be used to reduce the chances of water filling waders during a fall. Boots should have felt or studded soles to reduce the chances of slipping or falling.

- Use extreme caution when wading in streams above the knee. Also, watch out for deep pools!
- Samplers should exhibit caution around stream bank mud, boulders, bedrock or large woody debris to reduce the threat of a falling injury.
- Secure permission from landowner at selected site (most streams are bordered by private property).
- As a rule of thumb, do not enter stream during extreme temperatures.
- Do not stick hands or feet under large rocks, so as not to disturb snakes or snapping turtles. Exercise caution when handling aquatic life that has the ability to pinch, bite, etc.
- All water bodies have the potential to be contaminated. Caution should be taken to avoid water contact with body openings or cuts/sores. In addition, perform thorough hand washing/disinfection after all sampling.

Definitions

Calibrate – To adjust a piece of monitoring equipment by measuring a known standard and correcting any differences found in the reading to match the standard.

Grab sample - A small quantity of water collected for analysis as a representation of the condition of a waterbody at a particular moment in time.

Precipitate - A solid that has separated or condensed from a solution as the result of a chemical or physical change.

Titrate - To use a chemical of known volume and concentration to react with an unknown solution until the reaction is complete. This endpoint determines concentration.

Equipment

All equipment is on loan to volunteers from Watershed Watch for the duration of their involvement with the program. The cost of the equipment associated with Field Chemistry is approximately $200. Watershed Watch operates from limited grant funding, and it is important that all equipment be returned if volunteers retire from the program. This equipment can be refurbished and issued to a new volunteer.

A list of testing equipment currently used by Watershed Watch is found in the table below.

Equipment	Applicable Instructions for Use
LaMotte Wide Range pH kit	WWSOP01001 Cards 15-17
New pH kit/meter	WWSOP01001 Cards
LaMotte DO kit	WWSOP01001 Cards 18-22
Oakton old conductivity meter	WWSOP01001 Cards 24-25
Oakton new conductivity meter	WWSOP01001 Cards 23, 25
Thermometer (alcohol)	WWSOP01001 Card 26

Other field testing equipment is usable if calibrated and documented.
NOTE: Testing strips such as pH paper and “dip strips” are not accepted.

In addition to the test kits, some items are provided by Watershed Watch. The following is a list of additional equipment issued by Watershed Watch:

- Gloves (disposable)
- Chain of Custody Record form
- Waste container
- White pan
- Field Guidance cards

Watershed Watch does not provide some items that are needed to perform the Field Chemistry tests. The following is a list of other equipment that is provided by the volunteer:

- Eye Protection
- Pencil/indelible pen

- Distilled water
- First Aid kit (optional)
- Waders (optional)
- Hand sanitizer (optional)
- Personal Flotation Device (optional)
- Camera

Distilled water is required for rinsing all Field Chemistry sample containers and equipment after each test to ensure no residues in stream water remain on the container or equipment. These residues could possibly affect test results when equipment is next used.

If waders are worn, the use of a wading belt is recommended to reduce the risk of waders filling with water and causing a safety hazard.

Chemical Storage

While at the stream, all used chemicals must be disposed of in the Waste Container provided. This also includes the distilled water used to rinse field chemistry sample containers and equipment between samples.

All Field Chemistry equipment must be stored in a cool, dry place (climate controlled) location. Extreme heat and extreme cold will break down the chemicals and make them inaccurate or ineffective for the tests. The optimal storage location for testing equipment is cool, dry location out of reach of children and pets. The chemicals have a three year shelf life after opening if properly handled, and should be replaced by Watershed Watch at a recertification training workshop. If replacement chemicals, glassware, or equipment are needed, please contact local basin Watershed Watch leadership.

Chemical Safety

Volunteers must be aware that there are hazardous chemicals in the test kits. For example, the Dissolved Oxygen (DO) test uses a strong acid and alkali (like bleach), while the pH Test chemical is flammable. For this reason, caution must be used when handling chemicals and performing tests. For more information on the chemicals in the test kits, refer to the Material Safety Data Sheets (MSDS) found in Appendix A. Links to these MSDS can

also be found at www.wwky.org.

Because the tests don't require large amounts of these chemicals, immediately flushing with large amounts of water is usually enough first aid to prevent serious injury. However, this isn't usually true for the eyes. If the chemicals come in contact with your eyes, immediately flush them with a large amount of water and seek medical attention as needed. Specific first aid information is provided in the MSDS.

To help prevent injury, volunteers must always wear personal protective equipment when handling chemicals and collecting stream samples. Gloves to protect the skin and safety goggles or glasses for eye protection must be used for each sampling event. The advantage of safety goggles over eyeglasses or sunglasses is the fuller coverage of the eye area and adjacent facial skin.

Used chemicals collected in the plastic Waste Container while performing tests at the stream must be flushed into a system that goes to a municipal sewage treatment plant. Because of the potential sensitivity of septic systems to the chemicals, it is recommended that waste chemicals be disposed of in a municipal sewage treatment system. To ensure proper handling or disposal, bottles of old chemicals should be returned to Watershed Watch when replacement chemicals are received.

Introduction to Field Chemistry

The Watershed Watch Field Water Chemistry Assessment provides volunteer participants with a simplified approach to stream water quality evaluation through measurement and observation of stream systems.

Collection and analysis procedures used in this guide are designed to be low cost, quickly and easily performed, and provide hands-on experience for individuals, community volunteer groups, and school groups of all ages. By following this SOP, attending trainings and conducting stream assessments, the volunteer participants will:

- develop proficiency in sample collection and analysis

- develop a greater understanding to the stream or streams they are evaluating
- gain an understanding of the importance of Kentucky's water resources
- become part of the growing constituency of citizens who are strongly concerned with the fate of our state's precious streams and rivers
- supplement local, state and federal agencies in their efforts to protect and preserve the quality of Kentucky's streams

The Field Water Chemistry Assessment may assist in indicating the general condition of the river or stream and provide a “snapshot in time” of the water quality. Information obtained from long-term field observations will be compiled and serve as a generalized resource base for the evaluation of the quality of Kentucky's streams and rivers.

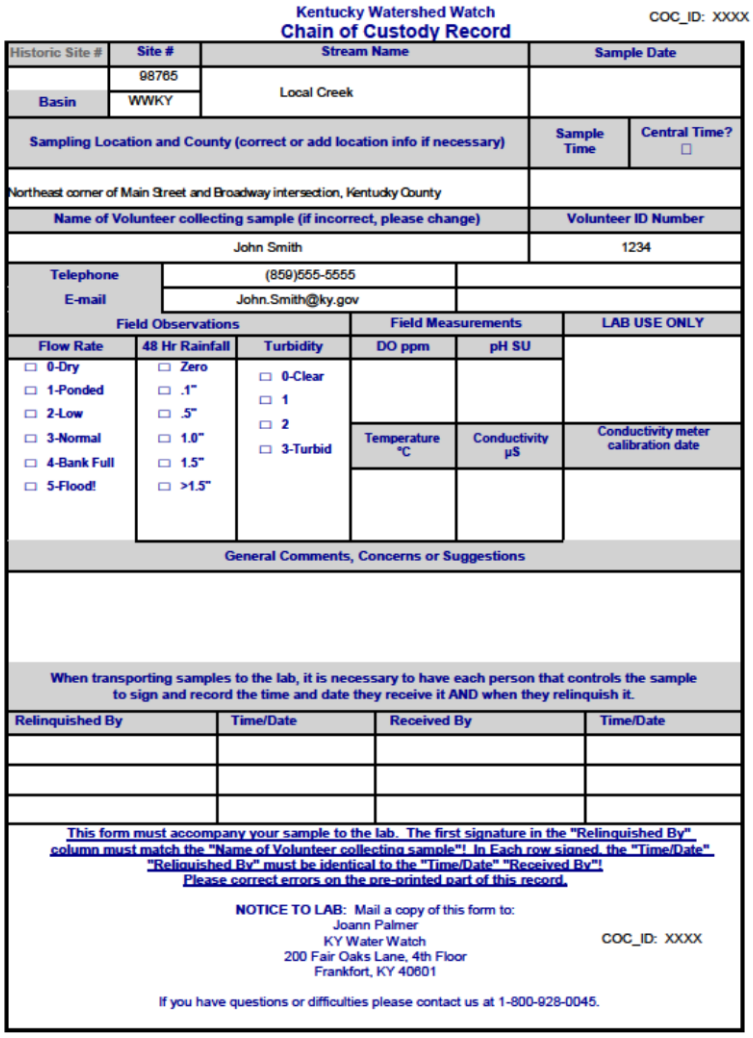
Poor water quality may have a specific and observable source, such as a sewage treatment plant outfall or an industrial discharge. These are referred to as point sources of pollution. However, not all sources of pollution will be easily identifiable. Most pollution is carried into streams by rain and snowmelt running off the ground surface. This is referred to as nonpoint source pollution. All types of pollution can have impacts on aquatic life and human uses of streams.

The introduction of human and livestock wastes and fertilizers results in organic enrichment or pollution. Small quantities of these wastes or chemicals can cause organic enrichment resulting in excessive blooms of algae and other aquatic plants. As these plants die and fall to the stream bottom, they decompose and consume dissolved oxygen in the water. This can result in severe oxygen depletion, which eliminates the sensitive types of aquatic life, leaving only those that can tolerate extremely low oxygen levels.

Chemical pollutants such as chlorine, acids, metals, pesticides (including herbicides) and oil affect macroinvertebrates according to their tolerance to the pollutant. Generally speaking, however, a toxicity problem is usually the only condition that will render a stream totally devoid of macroinvertebrates.

Recordkeeping

A record of activity for each sampling site for each sampling event must be maintained. To document this task, Watershed Watch has developed a form called the "Watershed Watch Chain of Custody Record" (COC). This form contains pre-printed information describing the sample site and sampler. It also functions as a field measurement record and provides a place for field observations. A blank copy of this form can be found in Appendix A of this document.



Kentucky Watershed Watch
Chain of Custody Record

COC_ID: XXXX

Historic Site #	Site #	Stream Name	Sample Date
	98765	Local Creek	
Basin	WWKY		

Sampling Location and County (correct or add location info if necessary)	Sample Time	Central Time? ☐
Northeast corner of Main Street and Broadway intersection, Kentucky County		

Name of Volunteer collecting sample (if incorrect, please change)	Volunteer ID Number
John Smith	1234

Telephone	(859)555-5555	
E-mail	John.Smith@ky.gov	

Field Observations			Field Measurements		LAB USE ONLY
Flow Rate	48 Hr Rainfall	Turbidity	DO ppm	pH SU	
☐ 0-Dry ☐ 1-Ponded ☐ 2-Low ☐ 3-Normal ☐ 4-Bank Full ☐ 5-Flood!	☐ Zero ☐ .1" ☐ .5" ☐ 1.0" ☐ 1.5" ☐ >1.5"	☐ 0-Clear ☐ 1 ☐ 2 ☐ 3-Turbid			
			Temperature °C	Conductivity µS	Conductivity meter calibration date

General Comments, Concerns or Suggestions

When transporting samples to the lab, it is necessary to have each person that controls the sample to sign and record the time and date they receive it AND when they relinquish it.

Relinquished By	Time/Date	Received By	Time/Date

This form must accompany your sample to the lab. The first signature in the "Relinquished By" column must match the "Name of Volunteer collecting sample"! In Each row signed, the "Time/Date" "Relinquished By" must be identical to the "Time/Date" "Received By"!
Please correct errors on the pre-printed part of this record.

NOTICE TO LAB: Mail a copy of this form to:
Joann Palmer
KY Water Watch
200 Fair Oaks Lane, 4th Floor
Frankfort, KY 40601

COC_ID: XXXX

If you have questions or difficulties please contact us at 1-800-928-0045.

The COC is the record for maintaining a legal defensible document of the possession of samples, from collection to receipt at a laboratory. most important for documenting samples going to the laboratory. For Field Chemistry measurements, entries on the COC aren't tied to documentation of sample handling, but will indicate the official conditions present in the stream for that sampling event. Therefore, care should be taken to ensure that protocols are correctly performed and documented on the form. If any of the Field Chemistry parameters cannot be measured, write "Not Collected" in the appropriate space.

Field Observations and Water Chemistry Assessment Procedures

For all of these procedures, it is important for volunteers to:

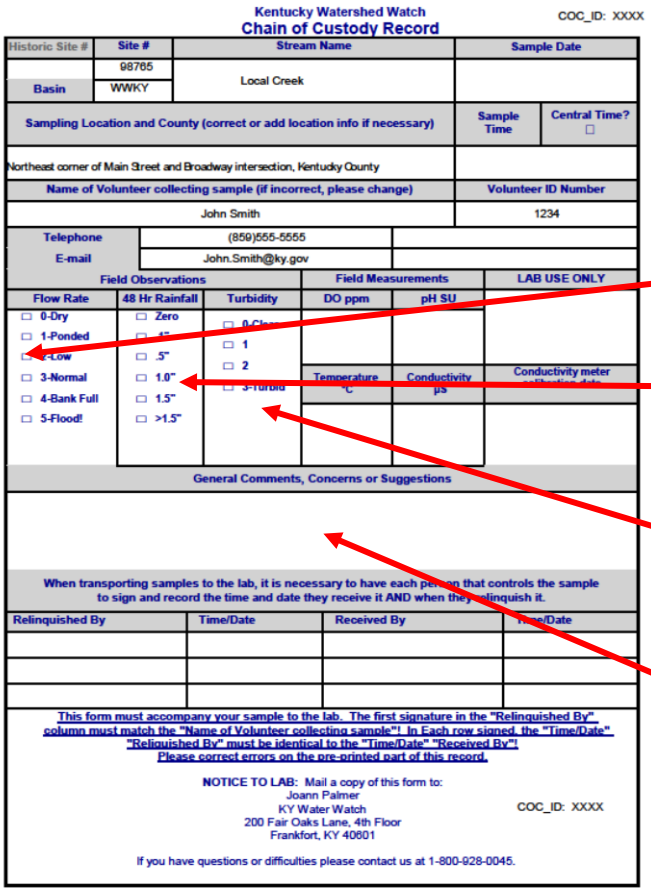
- Enter stream at a downstream location
- Walk upstream to avoid disturbing bottom

- Perform observations and tests just below grab sample location
- Collect samples at approximately the same time of day each time

Field Observations

Certain conditions are site specific and can vary each time a sample is collected. When these conditions change, samples can be impacted as a result. Therefore, it is important to record observations about each sampling site for each sampling event. This information can assist with more accurate interpretation of the sample results. The Field Observations to be made each time are:

- Flow Rate
- 48 Hour Rainfall
- Turbidity
- Other Observations



Kentucky Watershed Watch
Chain of Custody Record

COC_ID: XXXX

Historic Site #	Site #	Stream Name	Sample Date
	98765	Local Creek	
Basin	WWKY		

Sampling Location and County (correct or add location info if necessary)	Sample Time	Central Time?
Northeast corner of Main Street and Broadway intersection, Kentucky County		

Name of Volunteer collecting sample (if incorrect, please change)	Volunteer ID Number
John Smith	1234

Telephone	(859)555-5555	
E-mail	John.Smith@ky.gov	

Field Observations			Field Measurements		LAB USE ONLY
Flow Rate	48 Hr Rainfall	Turbidity	DO ppm	pH SU	
0-Dry	Zero	0-Clear			
1-Ponded	.1"	1			
2-Low	.5"	2	Temperature °C	Conductivity µS	Conductivity meter
3-Normal	1.0"	3-Turbid			
4-Bank Full	1.5"				
5-Flood!	>1.5"				

General Comments, Concerns or Suggestions

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Flow
0-5 point scale

48 Hour Rainfall
Recorded in inches

Turbitiy
0-3 point scale

Other observations
Record any observations you think are important to your sample.

Flow Rate

Flow is a measurement of how much water is moving through the stream channel. This measurement is affected by recent precipitation in the watershed and the amount of time it takes to reach the stream. For Watershed Watch, measurement of flow is limited to visual observations of flow in the stream channel. This measurement helps the volunteer determine whether to sample, and can help to explain differing results obtained during various weather and stream conditions. Watershed Watch measures flow using a subjective assessment of water in the stream using a 0-5 point scale where:

0 = Dry
1 = Ponded
2 = Low
3 = Normal
4 = Bank Full
5 = FLOOD!

When a stream is flooded (score of 5), or ponded without a connecting flow upstream or downstream (score of 0 or 1), samples should not be collected.

When a stream is in flood conditions, it is no longer confined to the channel and can be extremely, deceptively hazardous. Because of the safety risks, sampling must not be attempted in flood conditions. The sampler's safety is the first priority.

Ponded without connecting flow means the water is isolated to separate pools that do not have visible flow linking them. Since flow from upstream contributes to a stream's actual conditions, water in isolated pools without connected flow is not representative of true stream conditions.

Bank full means the water in the stream has risen until it is level with the top of either side bank of the stream and will soon begin to flow outside either bank.

It may be necessary for volunteers to make several visits to the sampling site to become familiar with what level of flow is normal for that stream. Their estimations will even out as stream knowledge increases. Unexplained

flow conditions above or below normal can indicate problems in the watershed. Volunteers who observe these conditions should discuss this with Watershed Watch leadership.

48 Hour Rainfall

This observation refers to the amount of rainfall measured in the 48 hour period immediately preceding a sampling event. Typically this is determined through a device that captures rainfall, which is measured and then discarded. The best results are obtained using measurements that are taken as close as possible to the sampling location, or in the watershed where the sample is taken. There are several options that can be used to help determine rainfall results, including:

- *Rain gauge* (if located near sampling site, and properly maintained)
- *Kentucky Mesonet* - A quality-assured network of automated weather and climate monitoring stations managed by the Kentucky Climate Center at Western Kentucky University. The future goal for the network is to have at least one station per county, but currently not all counties have stations. www.kymesonet.org/
- *Community Collaborative Rain, Hail and Snow Network* - CoCoRaHS is a non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow). www.cocorahs.org/state.aspx?state=ky
- *Kentucky Climate Data at UK Ag Weather Center* - a listing of daily climate reports from a number of sites within Kentucky, as well as a few sites from bordering states for 1971 through the current year. These data are based on the 24 hour period 7PM to 7PM. wwwagwx.ca.uky.edu/cgi-bin/ky_clim_data_www.pl
- *National Weather Service* - The precipitation data are quality-controlled, multi-sensor (radar and rain gauge) precipitation estimates obtained from National Weather Service (NWS) River Forecast Centers (RFCs). http://water.weather.gov/precip/ - select “Archive: Daily” under “1. Timeframe” at bottom of map and select “States” and “Kentucky” under “3. Location”. Select each of the two dates preceding the sampling date, and then total the rainfall amounts for both days.
- *Local media sources* – If the previous sources aren’t accessible, volunteers may use local/regional television stations, radio stations, or newspaper

- *The Weather Channel website* - Provides forecasts for terrestrial and satellite radio stations, newspapers, and websites. www.weather.com – search for zip code or town nearest to sampling location and then select "Monthly" from list on left margin of page. Rainfall amounts for two preceding days will appear on those dates on calendar.

Watershed Watch records rainfall in inches, using the following scale, selecting the unit that most closely represents the actual rainfall amount:

48 Hr Rainfall
Zero
0.1"
0.5"
1.0"
1.5"
>1.5"

The presence or absence of runoff due to rainfall prior to sampling events can help explain and interpret sample results. High levels of pollution in samples taken after a heavy rainfall event can indicate nonpoint source (runoff) pollution, while high contamination levels when no rainfall occurred prior to a sample event may indicate point sources of pollution.

Turbidity

Turbidity measures the clarity of a liquid and the amount that material suspended in the liquid decreases the passage of light through it. Any particles in the water will reduce the clarity and increase the turbidity. Turbidity can be caused by particles suspended in runoff, particles resulting from bank and stream bed erosion, sediments resuspended during high flows, and/or organic particles. Turbidity is not a measurement of the amount of suspended solids present or the rate of sedimentation of a stream; it measures only the amount of light that is scattered by the suspended particles.

For Watershed Watch, turbidity is measured using a subjective, visual assessment of water in the stream based on the following scale:

Value	Observation
0	Crystal Clear
1	Clear
2	Cloudy
3	Muddy

Other observations

Volunteers should be observant when visiting sampling sites or any stream. Record any observations that appear important to the sample or sampling conditions. If the unnatural or unusual stream and surrounding area's conditions are severe, they should be reported to the Division of Water. These may include:

- Putrescent or otherwise objectionable bottom deposits
- Oil, scum, and floating debris in amounts that are unsightly
- Nuisance levels of odor, color, other conditions

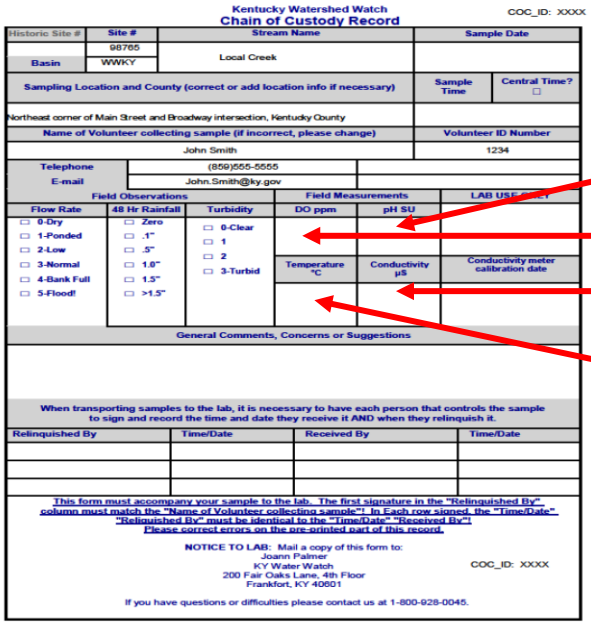
Additionally, volunteers should use this section to record equipment needs (e.g., conductivity meter batteries) or malfunctions, changes to normal protocol (e.g., flooded: sampling with bucket from bridge), or similar items that may affect sampling data.

Field Measurements

Samples should not be collected in extremely low-flow conditions, when the stream is pooled, and/or when there is not apparent flow between pools. Take caution not to contaminate samples with material from the bottom of the stream. Samples should not be collected when sample container cannot

be submerged without fear of collecting sediment or other material from the stream bed. These results should be recorded after tests are completed.

Collect the sample in mid-stream and mid-depth if possible. Avoid stagnant water and sample as far from the shoreline as is safe.



Kentucky Watershed Watch
Chain of Custody Record

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	98765	Local Creek	
Basin	WWKY		

Sampling Location and County (correct or add location info if necessary)	Sample Time	Central Time? ☐
Northeast corner of Main Street and Broadway intersection, Kentucky County		

Name of Volunteer collecting sample (if incorrect, please change)	Volunteer ID Number
John Smith	1234

Telephone	(859)555-5555
E-mail	John.Smith@ky.gov

Field Observations			Field Measurements		LAB USE ONLY
Flow Rate	48 Hr Rainfall	Turbidity	DO ppm	pH SU	
☐ 0-Dry ☐ 1-Ponded ☐ 2-Low ☐ 3-Normal ☐ 4-Bank Full ☐ 5-Flood!	☐ Zero ☐ .1" ☐ .5" ☐ 1.0" ☐ 1.5" ☐ >1.5"	☐ 0-Clear ☐ 1 ☐ 2 ☐ 3-Turbid	Temperature °C	Conductivity µS	Conductivity meter calibration date

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200 Fair Oaks Lane, 4th Floor
Frankfort, KY 40601

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If you have questions or difficulties please contact us at 1-800-928-0045.

Water Chemistry Tests

- pH
- Dissolved Oxygen
- Conductivity
- Temperature

Procedures for all Field Water Chemistry Tests:

- Sampler will need to put on gloves provided with the kit.
- Collect water <u>just below</u> the grab sample location.
- Rinse bottle, tube or cup and any associated caps or lids with stream water <u>three times</u> by filling container ¼ full of stream water, capping, shaking, and discarding downstream.
- Point mouth of bottle, tube or cup directly at the surface of the water, submerge entire container to mid-depth of stream and fill to appropriate level.

pH Description

pH is a measurement that expresses the acidity or alkalinity of a liquid. Uses a scale of 0-14, where 0 is the strongest acid and 14 is the strongest base. Alkali and base describe the same thing, a chemical compound with a pH greater than 7. Pure water is neutral, neither an acid nor a base, with a pH of 7; however, completely pure water rarely is neutral. pH can directly or

indirectly affect the toxicity of pollution (such as metals) in the water; in addition, body surfaces of animals or plants can be harmed.

The stronger the acid or base, the more likely it is damaging to plants and animals, humans included.

pH sources include industrial emissions that are carried to streams as acid rain; urban street runoff – cement or concrete make runoff more basic (or alkaline); acid mine drainage; runoff from decaying acidic plant and organic material; auto exhaust can contribute to acid rain or leave deposits on the ground that are then carried to the stream by runoff from rain or snow melt.

Stormwater runoff from agricultural, residential, and industrial areas may contain iron, aluminum, ammonia, mercury or other elements. The pH of the water will determine the toxic effects, if any, of these substances.

Test Procedures specific to pH- Hach Kit

Take samples and ensure each test tube is filled to 5.0 mL line with stream water in the two test tubes provided. When filling the test tubes, look for the “curve” in the surface of the water. This curve is caused by the relationship between the water surface and the glass and is called the “meniscus”. The center, lowest point of this meniscus, must be touching the 5.0 mL line on the tube or bottle to obtain an accurate measurement.

While holding Wide Range Indicator solution bottle vertically, add 10 drops of solution. It is important to hold the bottle straight up so the size of the drops is consistent. You can explore this difference in sizes by tilting the bottle at different angles and making drops on a piece of paper.

Replace the cap to mix the solution in the test tube and avoid contact with your skin.

- This will prevent your skin from being exposed to the chemical and

- prevent any chemicals on your skin or glove from entering the solution, which may affecting the results of your test

Place the test tube in appropriate location in comparator and compare with color standards. Observe the color of the water in the test tube and place it in the opening in the comparator that is closest match for color. Try holding the comparator in front of white paper (back of COC) if you experience difficulty comparing colors.

Rotate color disc until colors in tube windows match (best match may occur between two color segments). If the color you have obtained through your test is not exactly one color or the other, estimate a value between the two. The colors in the comparator represent changes in pH in increments of 0.5. Record the results in the pH box of your COC.

Remember to rinse test tube and cap with distilled water! Shake out any excess distilled water from the containers.

Test Procedures specific to pH- LaMotte Kit

Take sample and ensure test tube is filled to 5.0 mL line with stream water.

While holding the Wide Range Indicator solution bottle vertically, add 10 drops of solution, cap and mix.

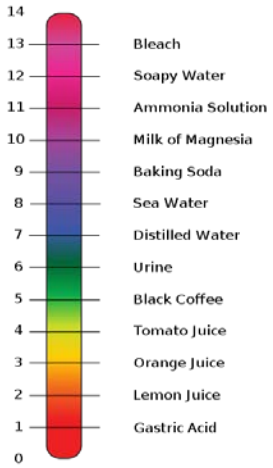
Place the test tube in the appropriate location in the comparator and compare with color standards. You may be in between colors and need to move it between the two closest match openings to decide. If the color you have obtained through your test is not exactly one color or the other, estimate a value between the two nearest 0.1.

Record the result as pH.

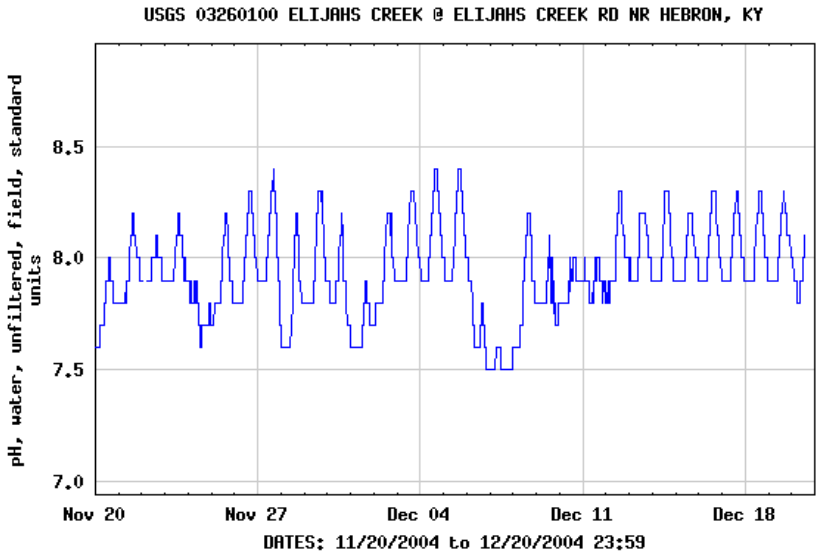
pH Water Quality Standards

A pH range of 6.0 to 9.0 appears to provide protection for the life of freshwater fish and bottom dwelling invertebrates. The same pH range between 6-9 standard units is also used as a primary contact recreation criterion for safe human mucous membrane contact.

pH Interpretation



pH of some common liquids



Here are continuous pH readings from a US Geological Survey gaging station in a creek in Northern KY. (Taken from a Sanitation District No. 1/USGS gaging station) The daily fluctuations of pH in the stream can be due to the functions of respiration and photosynthesis that take place in algae and submerged plants. Through the process of photosynthesis, plants take in carbon dioxide, turn it into carbohydrates in the presence of sunlight and give off oxygen. This removal of the acidic carbon dioxide makes the water more alkaline and raises the pH. During respiration oxygen is taken in, carbohydrates are used as energy for growth and carbon dioxide is released. Carbon dioxide in water makes it slightly acidic and lowers the pH. When the sun is shining, photosynthesis is the dominant function, so the water becomes more basic (alkaline) as the day wears on and more oxygen is given off into the water. After the sun goes down, photosynthesis stops, but respiration continues. This builds up the levels of carbon dioxide in the water and makes it more acidic. If you have an overgrowth of algae and plants in a stream, the highs become higher and the lows become lower.

Dissolved Oxygen (DO)

DO is a measurement (in mg/l, or parts per million) of oxygen gas that is dissolved in water. Faster moving or colder water holds more DO than does slow moving or warmer water. Low levels can be harmful to aquatic life over a long time (chronic) or at even lower levels for a short time (acute).

The organisms that live in bodies of water must have an adequate supply of dissolved oxygen to survive and thrive. Any pollution or stream condition that causes the DO to dip below the levels required for organisms to survive, may result in mass die-off of the organisms. Even if the drop in DO doesn't last long, the organisms can't hold their breath until it rises again.
The visible result of a mass die-off is a fish kill, but many of the macroinvertebrates (insects, crayfish, mussels, etc.) also die. They are small so we don't see their carcasses.

Some sources that may influence DO are sewer overflow that sends sewage/organic pollution to an adjacent stream; agricultural/nutrient runoff from a plowed and fertilized field; high water temperature due to lack of riparian, or streamside, plants and trees that shade the water; chemical spills or discharges that cause the DO to drop.

Test Procedures specific to DO:

- Put on gloves.
- Fill Water Sampling Bottle with stream water. Ensure that no air bubbles are in the capped sample collected. Inverting the bottle is the easiest way to check this.
- Holding the Manganous Sulfate Solution vertically over the filled sampling bottle, add 8 drops to sample bottle.

- Holding the Alkaline Potassium Iodide Azide vertically over the sampling bottle, add 8 drops to sample bottle.

- Cap sample bottle and mix, quickly tilting the capped bottle back and forth in a shaking motion to ensure thorough mixing. Allow precipitate to settle below the shoulder of the bottle.

- Add 8 drops of Sulfuric Acid 1:1. Remember the importance of holding the dropper bottle vertically for consistent drop size.
- Cap sample bottle and mix vigorously until the “sparkly flakes” can no longer be seen in the clear brown solution which means the precipitate has dissolved. **NOTE**: Sulfuric Acid is a very strong acid and can cause severe burns to your skin or body openings. Use extra caution with this chemical. Conduct test over white pan.

- Pouring from the sample bottle, fill test tube/vial to 20 mL line and re-cap sample bottle.

The center, or bottom, of the meniscus of the liquid must be touching the 20 ml line for accurate measurement. Do not to discard the rest of the liquid in the sample bottle. If a mistake occurs in the rest of the procedure, rinse the test tube (vial), refill the titrator (syringe), and start the procedure again at this step. Place the plastic cap with a small hole in the center onto the test tube (vial).

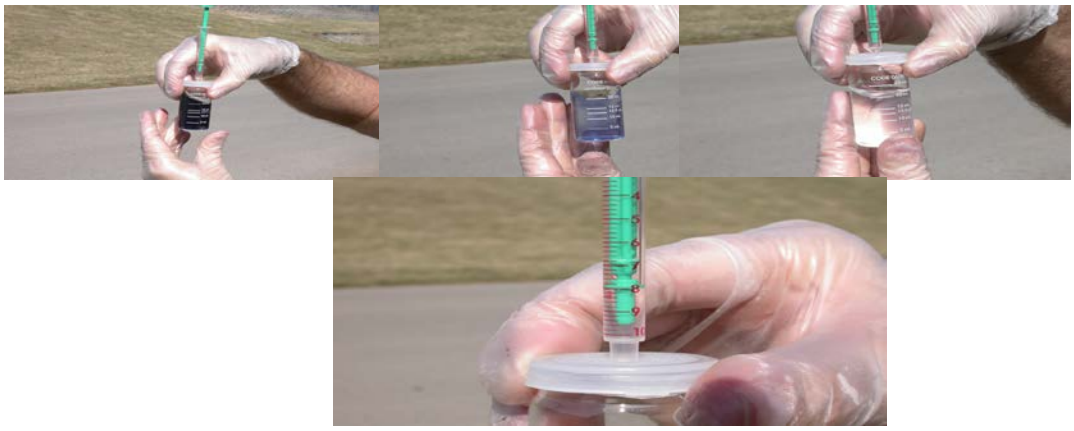
- Fill titrator (syringe) with Thiosulfate (Sodium Thiosulfate) to zero line.

The ‘wet edge’ of the green “plunger” in the titrator must be touching the 0 line for accurate measurement. It is vital to accurate measurement that there no bubbles are present in the titrator. This is most easily accomplished by inserting the tip of the titrator into the Thiosulfate bottle and drawing some of the liquid into the titrator and then push the liquid back into the bottle. When you re-draw the liquid into the titrator, it should be bubble-free. If not, slowly moving the titrator up and down may also help with eliminating air bubbles.

Be sure the tip of the titrator full of Thiosulfate remains inserted into the small hole in the center of the cap on the test tube (vial).

- Slowly press the green “plunger” in the titrator until a drop forms on the tip and falls into the sample in the test tube (vial).
- Then swirl the test tube until the drop is thoroughly mixed in (dark blue/purple color). Repeat this process of “single drop and swirl” until the sample turns a pale yellow. (Refer to Flip Cards, page 20 and 21 for comparison.)
- Remove the cap, but leave the tip of the titrator sticking in the center of the cap.

- Holding the Starch Indicator bottle vertically, add 8 drops.Replace the test tube cap with the titrator in it and swirl the test tube to mix the solution.



- Continue the “single drop and swirl” until the point where the last drop causes the blue/purple color to totally disappear and the solution is clear and colorless.

The reading on the titrator should be obtained from the ‘wet edge’ of the plunger. This number is the level in mg/l, or ppm, of DO in the sample.
<u>If you use all of the Thiosulfate in the titrator before the blue color disappears</u>:

- remove the titrator from the cap
- refill it with the Thiosulfate (Sodium Thiosulfate), again making sure there are no bubbles in the titrator
- then reinsert titrator in cap
- continue the “single drop and swirl” until the point where the last drop causes the blue/purple color to totally disappear and the solution is clear and colorless
- Read the level left in the titrator, <u>then add 10</u> to that for the final ppm DO result

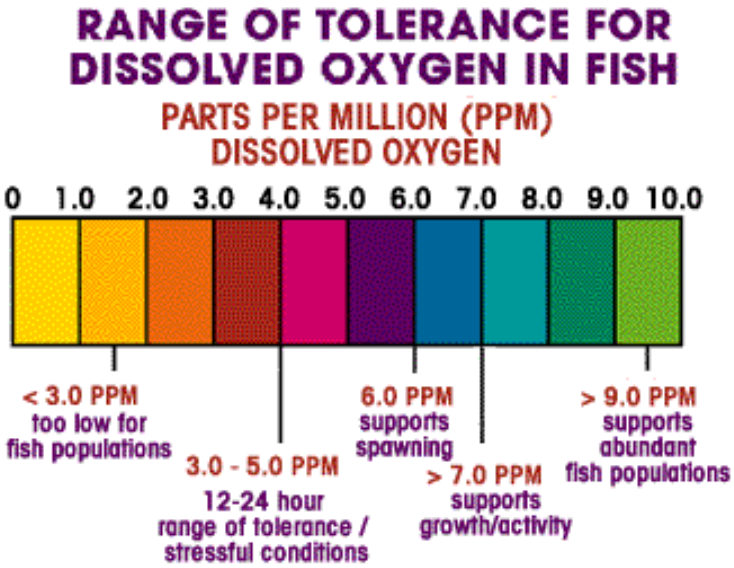
Remember to rinse Water Sampling Bottle, test tube and lid, and Titrator with distilled water!

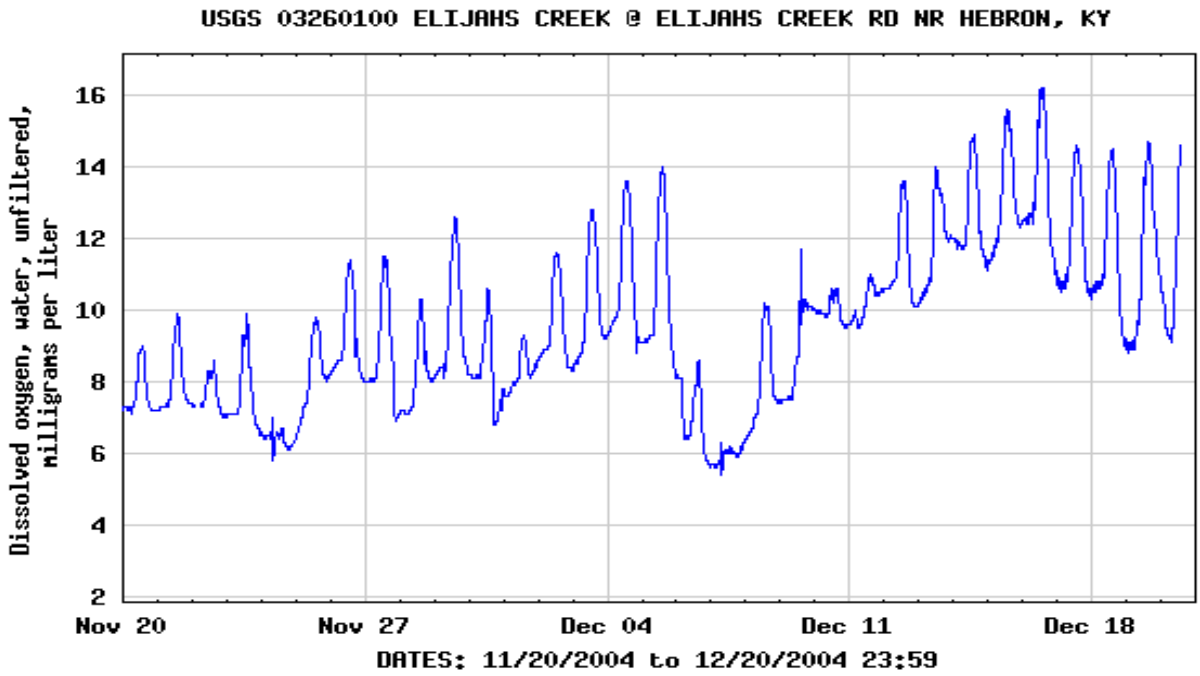
DO Water Quality Standards

The Kentucky Surface Water Standard for DO is 5.0 mg/L. This level must be maintained throughout a 24 hour period as an average (chronic level). Any dips in DO level below 5.0 mg/l during the 24 hour period cannot go lower than 4.0 mg/l (acute level).Generally, any level lower than 5.0 mg/l causes the following problems for the organisms that live in the stream:

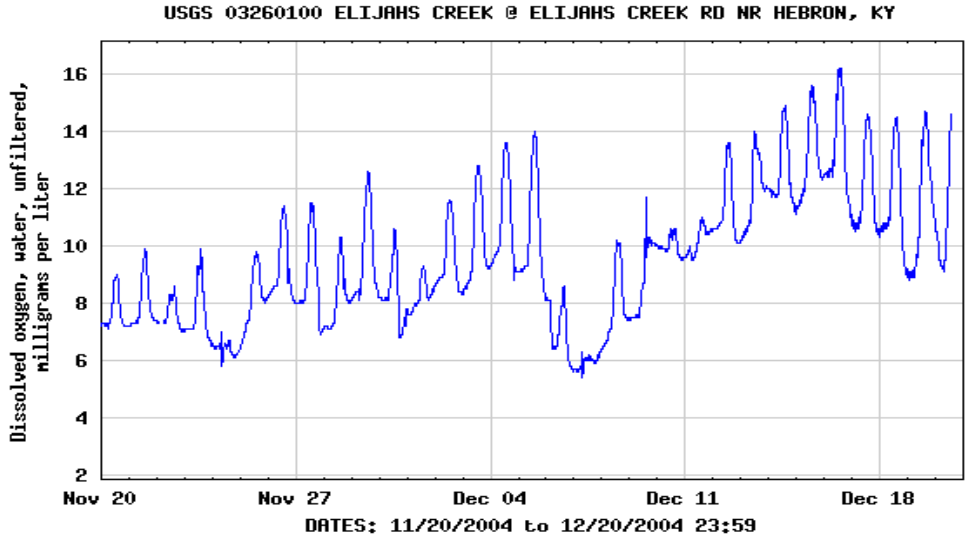
- increased sensitivity to other environmental problems
- lower growth rates
- changes the distribution of organisms found in the stream

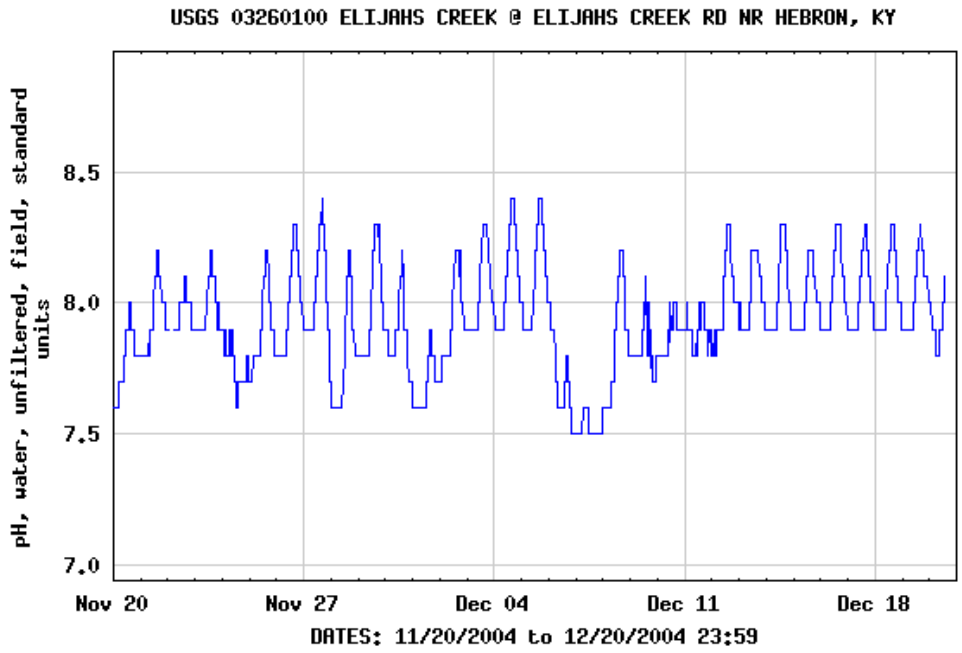
Different grou irements for DO levels.





Above you will find continuous DO readings from a US Geological Survey gaging station in a creek in Northern KY. (Taken from a Sanitation District No. 1/USGS gaging station) As with the pH readings, you see the daily increases and drops in levels.

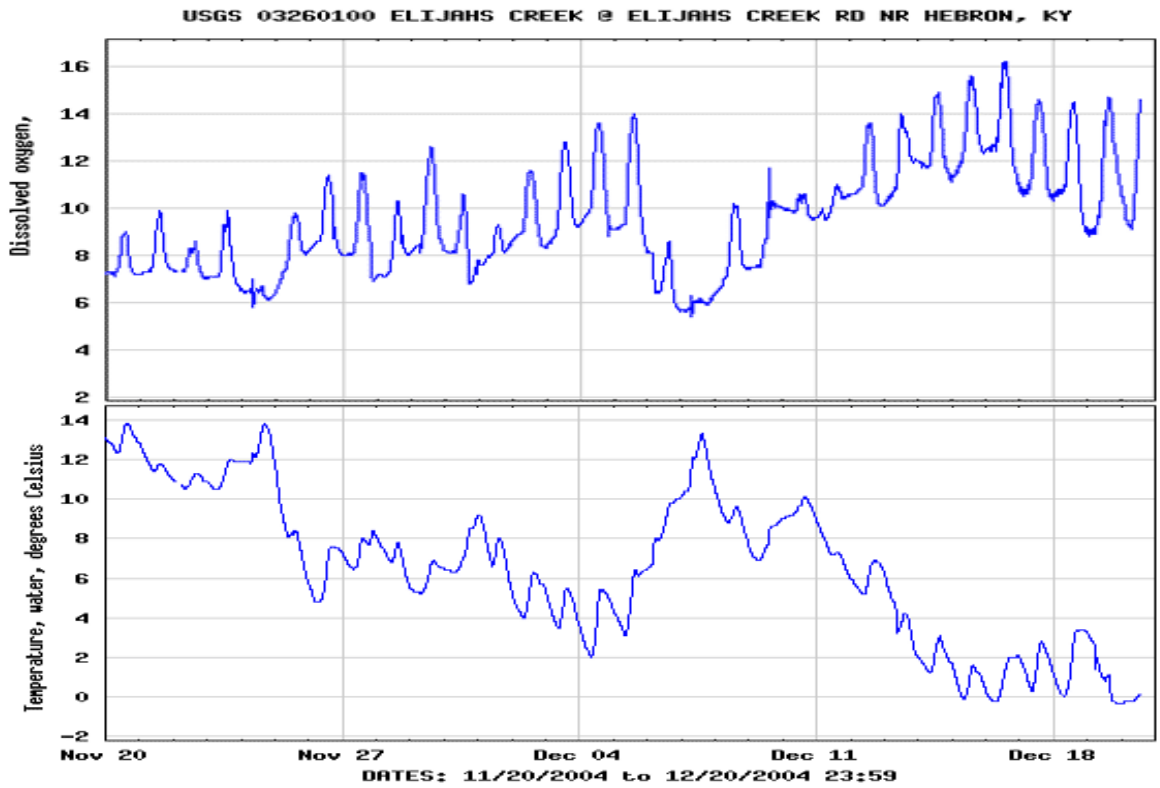




By comparing these graphs for DO and pH levels over the same time span, you can see they are closely associated. In the plant and algae daily processes:

- Photosynthesis gives off oxygen – increasing dissolved oxygen levels
- Respiration uses oxygen – decreasing dissolved oxygen levels

Again, if you have an overgrowth of algae and plants in a stream, the highs become higher and the lows become lower. In addition, with an overgrowth of algae, you also get a large amount of dead and decaying algae. The decay process also removes dissolved oxygen from the water. This can cause DO levels to plunge below the water quality standards.



In these graphs, the DO readings are compared to continuous Temperature readings from the same gaging station for the same timeframe. Colder water can hold more dissolved oxygen, so you see this inverse relationship between DO and Temperature.

Conductivity

Is a measurement (in microsiemens, or µS) of the capacity of water to conduct an electric current. Conductivity measurements are used to indicate levels of dissolved solids, such as nutrients, metals, or other compounds. The higher the level of dissolved substances in the stream, the higher the conductivity level. Conductivity in streams and rivers is affected by the geology of the area through which the water flows. For example, streams that flow through limestone and clay soils will have higher conductivity values.

Lower pH levels can result in higher levels of dissolved substances. High levels can indicate the presence of harmful pollutants and impacts to the aquatic system

Conductivity of water increases as the water temperature increases. The addition of fresh water (rain) lowers conductivity because rainwater has low conductivity and the increase in water levels dilutes dissolved solids concentrations. Conversely, during low flow conditions (summer and fall) the dissolved solids are more concentrated and therefore conductivity levels are higher.

Conductivity sources:

Top left to right: parking lot runoff (salts and other deicing agents carried into stream, also weathering of concrete ; mining runoff (runoff over soil and rock layers dissolves and carries minerals and compounds); acid mine drainage (the acidity of the discharge dissolves large amounts of metals and carries them into the stream); industrial discharges (can contain high levels of dissolved solids)

Conductivity Equipment

Watershed Watch has recently made changes to the equipment used for conductivity testing. New EcoTEster models have replaced the former

ECtestrs (yellow). The following procedures are detailed for both meters, as some volunteer's kits still include the "old" meter. Additionally, we have found the most efficient and cost effective conductivity standard to be the individual pouches of standard.

The meters measure conductivity in µS (microsiemens) or mmhos (micromhos) – these two units are equivalent. For Watershed Watch the standard solution used to be 718 µS – however, the meters we use only have readings by tens, so adjust the meter measurement in the standard to 720 µS.

The conductivity meter on the left is an older version used by WW groups. The one on the right is the new version.

New Meter Calibration

Display

Hold/Enter

Calibrate

Power

These are the features to become familiar with in order to follow the directions for calibrating the new version of the meter and measuring the conductivity level in water.

Calibration: The tester is factory calibrated. However, to ensure accuracy, regular calibration is recommended.

1. Soak sensor for 10 minutes in alcohol to remove stains/oils. Rinse in clean water and blot sensor dry
2. Press ⏻ to turn on the tester
3. Dip sensor fully into standard solution and wait for the value to stabilize
4. Press cal to enter the calibration sequence. Display flashes CAL momentarily and then shows a flashing default reading
5. Press hold/ent to scroll to the standard solution value
6. Release hold/ent and wait for the auto confirmation
7. To abort calibration, press cal to escape (ESC)
8. You have successfully calibrated the instrument

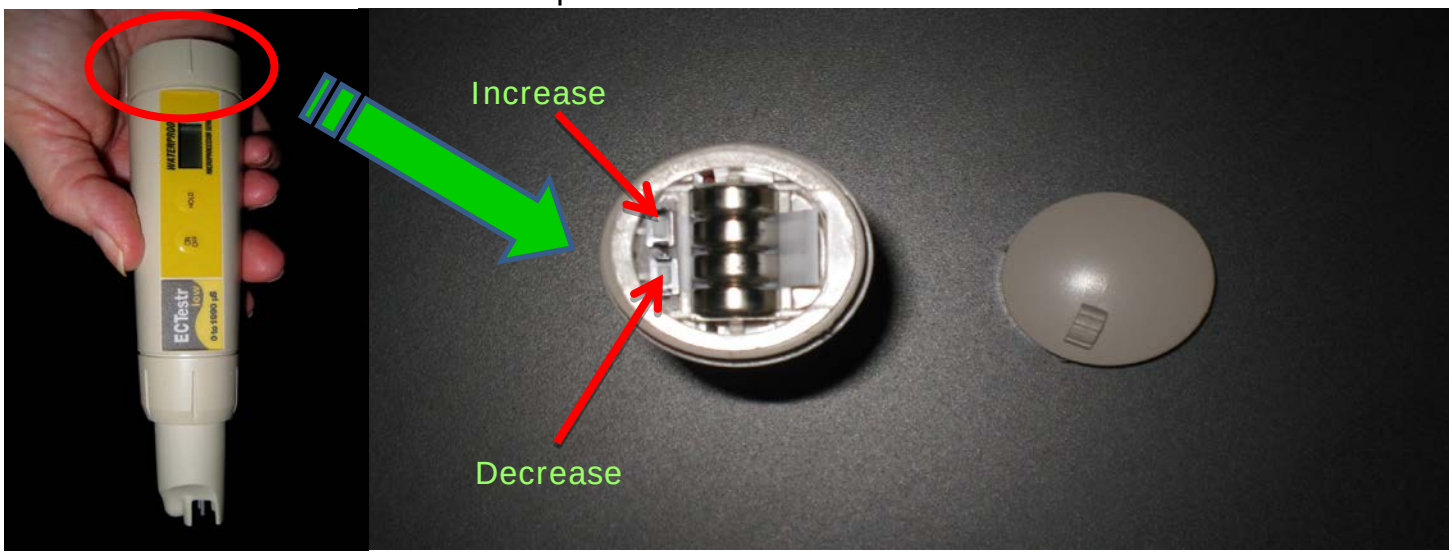
Old Meter Calibration

Display

Hold

On/Off

These are the features samplers must be familiar with in order to follow the



Some volunteers may have this older version of the conductivity meter. In order to complete the calibration of this version, the cap on the end is

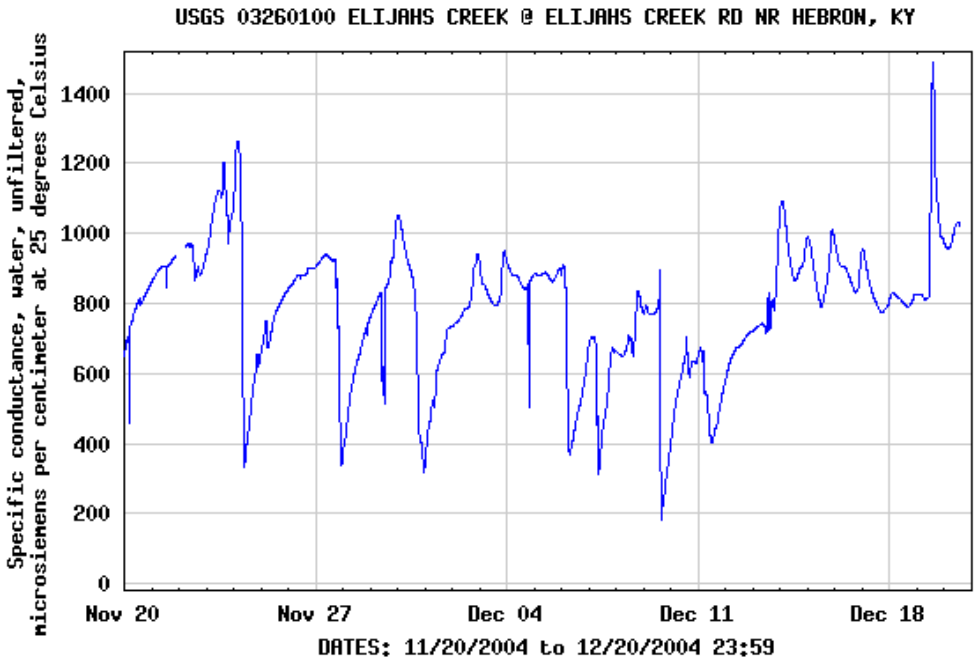
screwed off to reveal the two buttons used to increase or decrease the reading on the screen as the meter is held in the standard solution.

Calibration (Old Meter):

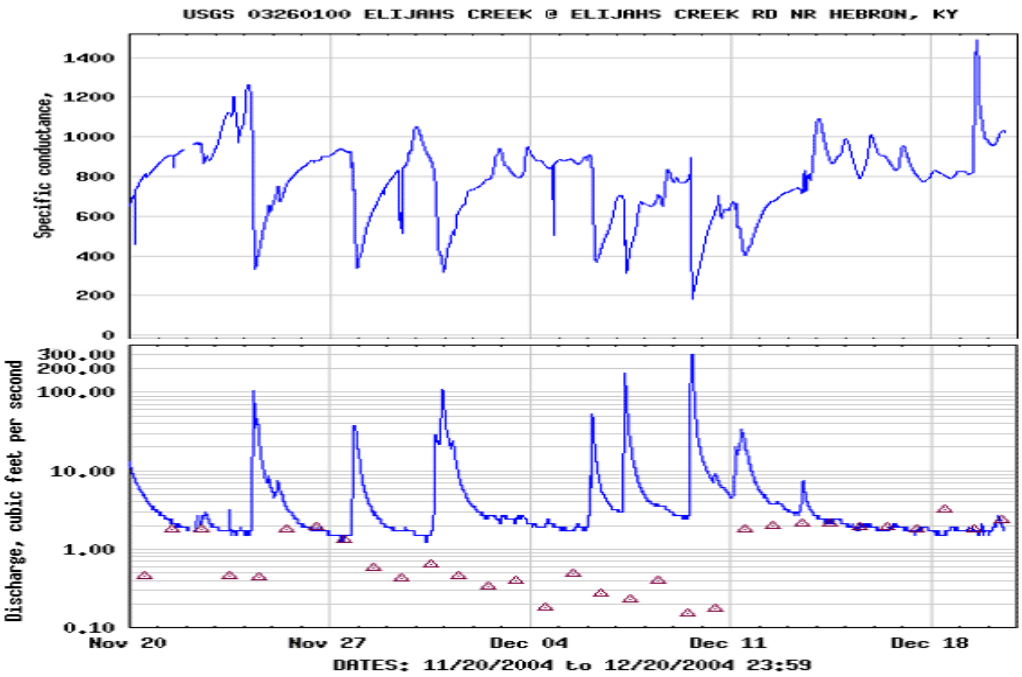
- Twist open lid on wider end (battery compartment)
- Place narrower end (electrodes) in calibration standard
- Press ON/OFF button and wait for display to stabilize
- When viewed from top, hold meter with white buttons on left
- Press the Increase (top) or Decrease (bottom) button until display reads 720 µS
- When display flashes 3 times, then shows ENT, the meter is calibrated
- Replace lid

Conductivity Interpretation

800uS is a standard for waterways used as a drinking water supply. WWKY has adopted 500µS to be a general benchmark for aquatic life use.



The graph above shows continuous Conductivity readings from a US Geological Survey gaging station in a creek in Northern KY. (Taken from a Sanitation District No. 1/USGS gaging station)



The graph above demonstrates the relationship between conductivity and flow. The addition of fresh water (rain) lowers conductivity because rainwater has low conductivity and the increase in water levels dilutes dissolved solids concentrations.

Temperature

Temperature is a measurement (in degrees Celsius) of the hotness or coldness of water in a stream. Celsius uses a scale with 0 °C as the freezing point for water and 100 °C as the boiling point. Higher temperatures in a stream can lead to lower levels of DO or may contribute to conditions where the absence of adequate streamside vegetation and other inputs to the aquatic system that are adversely affecting it.

In addition to having its own toxic effect, water temperature affects the solubility and the toxicity of many other water quality parameters. Generally, the solubility of solids increases with increasing temperature, while gases tend to be more soluble in cold water. An important physical relationship exists between the amount of dissolved oxygen in a body of water and its temperature.

- The warmer the water, the less dissolved oxygen.
- Colder water can maintain greater dissolved oxygen concentrations.

Sources of temperature fluctuations

Temperature fluctuations in a stream can result from power plant discharge of water used to cool boilers; sun heating bare stream – very few trees or plants on stream banks to shade and cool the water; and heat waves on parking lot – rain falling on that parking lot and running off into streams will carry the heat with it.

The Watershed Watch program uses Celsius thermometers exclusively for consistency across the state and with water resource management agencies. The thermometers in use do not contain mercury.
Temperature measurements should be recorded in °C.

Water Temperature Test Procedures

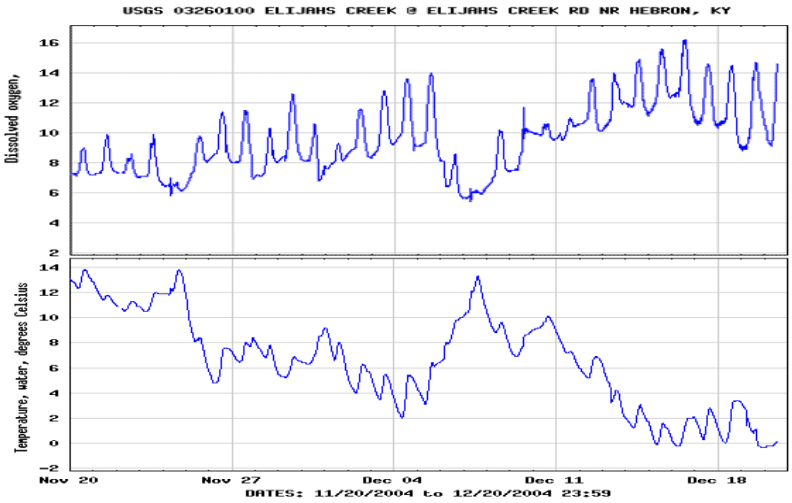
Water temperatures are often not uniform throughout the water column. By holding the bulb of the thermometer at mid-depth in flowing water will help assure a more generally representative temperature reading.

Water Quality Standards

Month/Date	Period Average		Instantaneous Maximum	
	(°F)	(°C)	(°F)	(°C)
January 1-31	45	7	50	10
February 1-29	45	7	50	10
March 1-15	51	11	56	13
March 16-31	54	12	59	15
April 1-15	58	14	64	18
April 16-30	64	18	69	21
May 1-15	68	20	73	23
May 16-31	75	24	80	27
June 1-15	80	27	85	29
June 16-30	83	28	87	31
July 1-31	84	29	89	32
August 1-31	84	29	89	32
September 1-15	84	29	87	31
September 16-30	82	28	86	30
October 1-15	77	25	82	28
October 16-31	72	22	77	25
November 1-30	67	19	72	22
December 1-31	52	11	57	14

From 401 KAR 10:031

This is a table from the Division of Water regulations that indicates the average and maximum allowable temperatures for surface waters in Kentucky throughout the seasons.



Temperature Interpretation

Here the DO readings are compared to continuous Temperature readings from the same gaging station for the same timeframe. Organisms that live in streams have various temperature requirements for survival, so temperature by itself is an important quality of the stream. However, it also is important because it has a magnifying effect on several other stream quality measurements.

Use Your Equipment!

Please conduct all field observations and field measurements for your site(s) at each sampling event. Please feel free to conduct these tests more frequently, some examples include:

- For educational demonstrations
- For personal interest
- For testing other locations

Appendix A

MSDS - Conductivity Calibrating Standard

-----MATERIAL SAFETY DATA SHEET-----

AURICAL COMPANY 383 BEACH ROAD BURLINGAME, CA 94010-2005
Factory Telephone: (650)-872-2800 fax: (650) 872-2227 Toll Free (800) 615-8870
Prepared: November 20, 1994. Revised: July 1, 2008.

This information is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability, or fitness for any particular use, or any other warranty, express or implied, with respect to this information, and we assume no liability resulting from the use of this information. Users should make their own investigations to determine the suitability of the information for their particular needs and purposes.

-----SUBSTANCE IDENTIFICATION-----

SUBSTANCE: ------Potassium Chloride Aqueous Solution, Dilute
Trade names/synonyms: This material is also known as Conductivity Standard, at all levels. Also known as Catalog Number 3-xxxx-x.
Cercla ratings (scale 0-3): health=0 fire=0 reactivity=0 persistence=0
Nfpa ratings (scale 0-4): health=0 fire=0 reactivity=0

-----COMPONENTS AND CONTAMINANTS---

Component: potassium chloride CAS# 7447-40-7 percent: <10.0
Component: water CAS# 7732-18-5 percent: 90+
Other contaminants: Antimicrobials and other additives less than 0.2% *Trade Secrets*.

Exposure limits: No occupational exposure limits established by osha, acgih or niosh.

-----PHYSICAL DATA-----
Description: clear, colorless liquid.
Approx. boiling point: 212°F (100°C). Approx. melting point: 32°F (0°C)
Vapor pressure: 14 torr @20°C Evap. Rate: (ether=1) >1

pH 4-8 Solubility in water: complete Vapor density: 0.7 (H_2O)

-----FIRE AND EXPLOSION DATA-----

Fire and explosion hazard: no fire hazard when exposed to heat or flame.
Flash point: not applicable

-----TOXICITY-----

potassium chloride:
Carcinogen status: none.
Local effects: irritant - skin, eye.
Acute toxicity level: no data available.
Target effects: no data available.

-----HEALTH EFFECTS AND FIRST AID-----

INHALATION: POTASSIUM CHLORIDE
ACUTE EXPOSURE - MAY CAUSE IRRITATION. CHRONIC EXPOSURE - REPEATED OR PROLONGED EXPOSURE MAY CAUSE IRRITATION. FIRST AID - REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION.
SKIN CONTACT: POTASSIUM CHLORIDE
ACUTE EXPOSURE - MAY CAUSE IRRITATION. CHRONIC EXPOSURE - REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS. FIRST AID - REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY, WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES).

EYE CONTACT: POTASSIUM CHLORIDE .
ACUTE EXPOSURE-DIRECT CONTACT MAY CAUSE IRRITATION, REDNESS AND PAIN. CHRONIC EXPOSURE-REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS FIRST AID - WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION POTASSIUM CHLORIDE .
ACUTE EXPOSURE - MAY CAUSE NAUSEA, VOMITING AND DIARRHEA. CHRONIC EXPOSURE - NOT REPORTED TO OCCUR IN HUMANS FIRST AID - IF VICTIM IS CONSCIOUS, IMMEDIATELY GIVE 2-4 GLASSES OF WATER, AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT, GET MEDICAL ATTENTION IMMEDIATELY.

-----REACTIVITY-----

Reactivity: stable under normal temperatures and pressures.

Incompatibilities: none known. Decomposition: none known. Polymerization: none known.

-----STORAGE AND DISPOSAL-----

Observe all federal, state and local regulations when storing or disposing of this substance. For assistance, contact the district director of the environmental protection agency.
Storage conditions to avoid: store away from incompatible substances.
Water spills: The California safe drinking water and toxic enforcement act of 1986 (prop 65) prohibits contaminating any known source of drinking water with substances known to cause cancer and/or reproductive toxicity.

Occupational spill: Flush with water and mop up.

-----PROTECTIVE EQUIPMENT-----

Special equipment not needed. Due caution in handling any chemical solution.

MSDS – Dissolved Oxygen

Material Safety Data Sheet

LaMotte

Issuing Date 12/16/2010 **Revision Number** 0

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name **Alk Potassium Iodide Azide**

Product Code(s) 7166

Recommended Use Laboratory chemicals. Industrial (not for food or food contact use). Test kit reagent.

Company
LaMotte Company, Inc.
802 Washington Avenue
P.O. Box 329
Chestertown, MD 21620
USA

Emergency Telephone Number
24 Hour Emergency Number (CHEM-TEL):
USA, Canada, Puerto Rico 1-800-255-3924
Outside North American Continent (Call collect) 813-248-0585

2. HAZARDS IDENTIFICATION

DANGER! POISON!

Emergency Overview

Corrosive
Liquid and mist can cause severe burns to all body tissue
May be fatal if inhaled, or swallowed
Water reactive

Appearance Clear, colorless solution **Physical State** Liquid **Odor** Odorless

OSHA Regulatory Status This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200). Safety information is given for exposure to the reagent as sold and considers exposure to the chemical if user has direct eye and skin contact.

Potential Health Effects
Principle Routes of Exposure Inhalation, skin contact, and ingestion

Acute Toxicity

Eyes Corrosive to the eyes and may cause severe damage including blindness.

Skin Corrosive. Contact with skin causes irritation to severe burns. Can cause redness, pain, and severe skin burns . Harmful if absorbed through skin.

Inhalation Poison - may be fatal if inhaled. Inhalation of corrosive mist may cause coughing, choking, headache, dizziness, and weakness for several hours. Pulmonary edema may occur with tightness in the chest, shortness of breath, bluish skin, decreased blood pressure, and increased heart rate. Depending on exposure, the effects from inhalation of corrosive mists can vary from mild irritation to serious damage to respiratory tract.

Ingestion Toxic if swallowed. Corrosive. Can cause immediate pain and burning in the mouth, throat, esphagus and GI tract. May cause nausea, vomiting, and diarrhea, and in severe cases death. Estimated lethal dose: ~5 grams.

Chronic Effects Prolonged exposure may cause chronic effects.

Main Symptoms Prolonged contact has a destructive effect on tissue.

Aggravated Medical Conditions Hypersensitivity may occur in those with preexisting skin disorders. Respiratory disorders. Preexisting eye disorders.

3. COMPOSITION/INFORMATION ON INGREDIENTS

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Chemical Name	CAS-No	Weight %
Potassium hydroxide	1310-58-3	70
Potassium iodide	7681-11-0	15
Sodium azide	26628-22-8	1.05
Water	7732-18-5	to 100%

4. FIRST AID MEASURES

General Advice Do not get in eyes, on skin, or on clothing. Do not breathe dust/fume/gas/mist/vapors/spray. Do not delay care and transport of a seriously injured person.

Eye Contact Immediately flush eyes with gentle stream of water for at least 15 minutes, occasionally lifting upper and lower eyelids. Call a physician immediately.

Skin Contact Wash off immediately with soap and plenty of water for at least 15 minutes while removing all contaminated clothing and shoes. Remove and wash contaminated clothing before re-use. Immediate medical attention is required.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration and contact emergency personnel. Call a physician immediately.

Ingestion DO NOT INDUCE VOMITING. Drink large quantity of water. Immediate medical attention is required. Never give anything by mouth to an unconscious person.

Protection of First-aiders Use personal protective equipment. See Section 8 for more detail. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

5. FIRE-FIGHTING MEASURES

Flammable Properties Not flammable.

Flash Point Not applicable

Suitable Extinguishing Media Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Explosion Data

Specific Hazards Arising from the Chemical

Contact with metals may evolve flammable hydrogen gas. React vigorously with water.

NFPA **Health Hazard** 3 **Flammability** 0 **Stability** 1 **Physical and Chemical Hazards** W

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Ensure adequate ventilation. Avoid contact with skin, eyes and inhalation of vapors. Use personal protective equipment. Refer to Section 8.

Methods for Containment Soak up with inert absorbent material, containerize, and hold for disposal. Do not flush to sewer.

Methods for Cleaning Up Neutralize spills with dilute acid such as acetic, hydrochloric or sulfuric, absorb with vermiculite or other inert substance and package in a suitable container for disposal . Prevent product from entering drains.

7. HANDLING AND STORAGE

Handling Handle in accordance with good industrial hygiene and safety practice. Prevent contact with skin, eyes and clothing. Do not ingest. Do not eat, drink or smoke when using this product.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, moisture, and incompatibles. Keep away from metals and organic halogens. Ensure that leaks or spills cannot reach drains, sewers or surface waters. Keep out of the reach of children.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Potassium hydroxide 1310-58-3	None Known	None Known	Ceiling: 2 mg/m^3
Potassium iodide 7681-11-0	None Known	None Known	None Known
Sodium azide 26628-22-8	None Known	None Known	Ceiling: 0.1 ppm Ceiling: 0.3 mg/m^3
Water 7732-18-5	None Known	None Known	None Known

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/Face Protection Safety glasses with side-shields.

Skin and Body Protection Wear protective gloves/clothing. Gloves & Lab Coat.

Respiratory Protection When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear, colorless solution	**Odor**	Odorless
Physical State	Liquid	**pH**	14
Flash Point	Not applicable	**Autoignition Temperature**	Not applicable
Boiling Point/Range	No data available		
Specific Gravity	~1.5 (water = 1)	**Vapor Pressure**	No information available
Vapor Density	No information available		

10. STABILITY AND REACTIVITY

Stability Stable under normal conditions of use and storage.

Incompatible Products Strong acids. Metals. Water-reactive, reacts vigorously with water.

Conditions to Avoid Excessive heat. Incompatible products.

Hazardous Decomposition Products Carbon oxides. Potassium oxides.

Hazardous Reactions Reacts violently with water. Contact with metals may evolve flammable hydrogen gas.

Hazardous Polymerization Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Potassium hydroxide	214 mg/kg (Rat)	None Known	85 mg/L Gambusia affinis 24 hr
Potassium iodide	None Known	None Known	None Known
Sodium azide	27 mg/kg (Rat)	20 mg/kg (Rabbit)	None Known
Water	90 mL/kg (Rat)	None Known	None Known

Chronic Toxicity

Chronic Toxicity Prolonged exposure may cause chronic effects.

Chemical Name	ACGIH	IARC	NTP	OSHA
Potassium hydroxide	None Known	None Known	None Known	None Known
Potassium iodide	None Known	None Known	None Known	None Known
Sodium azide	None Known	None Known	None Known	None Known
Water	None Known	None Known	None Known	None Known

Chemical Name	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Potassium hydroxide	None Known	None Known	None Known
Potassium iodide	None Known	None Known	None Known
Sodium azide	None Known	None Known	None Known
Water	None Known	None Known	None Known

12. ECOLOGICAL INFORMATION

Ecotoxicity

The material may be toxic to aquatic life.

Chemical Name	Toxicity to Algae	Toxicity to Fish	Microtox	Daphnia Magna (Water Flea)
Potassium hydroxide	None Known	None Known	None Known	None Known
Potassium iodide	None Known	None Known	None Known	None Known
Sodium azide	None Known	LC50= 0.7 mg/L Lepomis macrochirus 96 h LC50= 0.8 mg/L Oncorhynchus mykiss 96 h LC50= 5.46 mg/L Pimephales promelas 96 h	None Known	None Known
Water	None Known	None Known	None Known	None Known

Persistence and Degradability Based on components product is expected to be poorly eliminated from water and poorly biodegradable.

Bioaccumulation/Accumulation Some components of this material have some potential to bioaccumulate but not all have been tested. Sodium azide: When released into the soil, this material is not expected to biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the air, this material may be moderately degraded by photolysis..

Chemical Name	Log Pow

Potassium hydroxide	= 0.65 = 0.83
Potassium iodide	None Known
Sodium azide	None Known
Water	None Known

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method Dispose of in accordance with local regulations. Should not be released into the environment.

Chemical Name
Potassium hydroxide - 1310-58-3
Potassium iodide - 7681-11-0
Sodium azide - 26628-22-8
Water - 7732-18-5

Chemical Name	RCRA - Halogenated Organic Compounds	RCRA - P Series Wastes	RCRA - F Series Wastes	RCRA - K Series Wastes
Potassium hydroxide - 1310-58-3	None Known	None Known	None Known	None Known
Potassium iodide - 7681-11-0	None Known	None Known	None Known	None Known
Sodium azide - 26628-22-8	None Known	P105	None Known	None Known
Water - 7732-18-5	None Known	None Known	None Known	None Known

14. TRANSPORT INFORMATION

DOT

Proper Shipping Name	CORROSIVE LIQUIDS, TOXIC, NOS (Potassium hydroxide/Sodium azide solution)
Hazard Class	8
Subsidiary Class	6.1
UN-No	2922
Packing Group	II
Reportable Quantity (RQ)	1000

IATA

UN-No	2922
Proper Shipping Name	CORROSIVE LIQUIDS, TOXIC, NOS (Potassium hydroxide/Sodium azide solution)
Hazard Class	8
Subsidiary Class	6.1
Packing Group	II

IMDG/IMO

Proper Shipping Name	CORROSIVE LIQUIDS, TOXIC, NOS (Potassium hydroxide/Sodium azide solution)
Hazard Class	8
Subsidiary Class	6.1
UN-No	2922
Packing Group	II

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS

Potassium hydroxide 1310-58-3 (70)	Present	X	X	1-369	X	KE-29139	X	X
Potassium iodide 7681-11-0 (15)	Present	X	X	1-439	X	KE-29149	X	X
Sodium azide 26628-22-8 (1.05)	Present	X	X	1-482	X	KE-31357	X	X
Water 7732-18-5 (to 100%)	Present	X	X	ENCS	X	KE-35400	X	X

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

Chemical Name	CAS-No	Weight %	SARA 313 - Threshold Values %
Potassium hydroxide	1310-58-3	70	None Known
Potassium iodide	7681-11-0	15	None Known
Sodium azide	26628-22-8	1.05	1.0
Water	7732-18-5	to 100%	None Known

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

Clean Water Act
This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Component	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Potassium hydroxide 1310-58-3 (70)	1000 lb	None Known	None Known	X
Potassium iodide 7681-11-0 (15)	None Known	None Known	None Known	None Known
Sodium azide 26628-22-8 (1.05)	None Known	None Known	None Known	None Known
Water 7732-18-5 (to 100%)	None Known	None Known	None Known	None Known

Chemical Name	CAS-No	Weight %	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Potassium hydroxide	1310-58-3	70	None Known	None Known	None Known	None Known
Potassium iodide	7681-11-0	15	None Known	None Known	None Known	None Known
Sodium azide	26628-22-8	1.05	None Known	None Known	None Known	None Known
Water	7732-18-5	to 100%	None Known	None Known	None Known	None Known

CERCLA

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs
Potassium hydroxide	1000 lb	None Known
Potassium iodide	None Known	None Known
Sodium azide	1000 lb	1000 lb
Water	None Known	None Known

U.S. State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals

Chemical Name	CAS-No	California Prop. 65
Potassium hydroxide	1310-58-3	None Known
Potassium iodide	7681-11-0	None Known
Sodium azide	26628-22-8	None Known
Water	7732-18-5	None Known

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Potassium hydroxide	X	X	X	None Known	X
Potassium iodide	None Known	None Known	None Known	None Known	None Known
Sodium azide	X	X	X	None Known	X
Water	None Known	None Known	None Known	None Known	None Known

International Regulations

Mexico - Grade

Chemical Name	Carcinogen Status	Exposure Limits
Potassium hydroxide	None Known	None Known
Potassium iodide	None Known	None Known
Sodium azide	None Known	None Known
Water	None Known	None Known

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
E Corrosive material
D1B - Poisonous and Infectious material - immediate and serious effects - Toxic

16. OTHER INFORMATION

NFPA	HMIS	PPE	Transport Symbol

Health Hazard	3
Fire Hazard	0
Reactivity	2

Prepared By	Regulatory Affairs Department
Issuing Date	12/16/2010
Revision Date	
Revision Note	Initial Release.

Disclaimer
The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

Material Safety Data Sheet

LaMotte

Issuing Date 12/15/2010 **Revision Number** 0

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name **Manganous Sulfate Solution**

Product Code(s) 4167

Synonyms none

Recommended Use Laboratory chemicals. Industrial (not for food or food contact use). Chemical additive. Swimming pool chemicals.

Company
LaMotte Company, Inc.
802 Washington Avenue
P.O. Box 329
Chestertown, MD 21620
USA

Emergency Telephone Number
24 Hour Emergency Number (CHEM-TEL):
USA, Canada, Puerto Rico 1-800-255-3924
Outside North American Continent (Call collect) 813-248-0585

2. HAZARDS IDENTIFICATION

Emergency Overview
Harmful if swallowed
May irritate eyes and skin

Appearance Clear, Pink **Physical State** Liquid **Odor** None

OSHA Regulatory Status While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Potential Health Effects
Principle Routes of Exposure Skin contact, Ingestion

Acute Toxicity
Eyes Irritating to eyes.
Skin Irritating to skin.
Inhalation May cause irritation of respiratory tract.
Ingestion Harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Chronic Effects Chronic manganese poisoning primarily involves the central nervous system.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Weight %
Manganese sulfate monohydrate	10034-96-5	36
Water	7732-18-5	to 100%

4. FIRST AID MEASURES

General Advice Do not get in eyes, on skin, or on clothing.

Eye Contact Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin Contact Wash off immediately with soap and plenty of water for at least 15 minutes while removing all contaminated clothing and shoes. Consult a physician.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration and contact emergency personnel. Call a physician immediately.

Ingestion DO NOT induce vomiting unless directed to do so by a physician or poison control center. Never give anything by mouth to an unconscious person. Consult a physician.

Protection of First-aiders Use personal protective equipment. See Section 8 for more detail. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

5. FIRE-FIGHTING MEASURES

Flammable Properties Not a fire hazard.

Flash Point Not applicable

Suitable Extinguishing Media Water spray, dry chemical, carbon dioxide (CO_2), or foam.

Explosion Data
NFPA **Health Hazard** 1 **Flammability** 0 **Stability** 0 **Physical and Chemical Hazards** -

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Refer to Section 8. Avoid contact with skin, eyes and clothing.

Methods for Containment Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see Section 13).

Methods for Cleaning Up Use personal protective equipment. Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see Section 13). Following product recovery, flush area with water.

7. HANDLING AND STORAGE

Handling Handle in accordance with good industrial hygiene and safety practice. Use only in area provided with appropriate exhaust ventilation. Prevent contact with skin, eyes and clothing. Do not ingest. Do not eat, drink or smoke when using this product.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and incompatibles. Keep out of the reach of children.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH

Manganese sulfate monohydrate 10034-96-5	TWA: 0.2 mg/m^3	None Known	IDLH: 500 mg/m^3 TWA: 1 mg/m^3 STEL: 3 mg/m^3
Water 7732-18-5	None Known	None Known	None Known

Personal Protective Equipment

Eye/Face Protection Safety glasses with side-shields.

Skin and Body Protection Gloves & Lab Coat.

Respiratory Protection Use only with adequate ventilation. In case of insufficient ventilation wear suitable respiratory equipment.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear Pink	**Odor**	None
Physical State	Liquid	**pH**	3
Flash Point	Not applicable	**Autoignition Temperature**	Not applicable
Boiling Point/Range	No information available	**Freezing Point**	No information available
Solubility	Soluble	**Vapor Pressure**	<17 mmHg @ 20°C
Vapor Density	No data available		

10. STABILITY AND REACTIVITY

Stability Stable under normal conditions of use and storage.

Incompatible Products Strong bases. Metals.

Conditions to Avoid Excessive heat.

Hazardous Decomposition Products Sulfur oxides. Manganese oxides.

Hazardous Polymerization Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Manganese sulfate monohydrate	None Known	None Known	None Known
Water	90 mL/kg (Rat)	None Known	None Known

Chronic Toxicity

Chronic Toxicity Chronic manganese poisoning primarily involves the central nervous system.

Chemical Name	ACGIH	IARC	NTP	OSHA
Manganese sulfate monohydrate	None Known	None Known	None Known	None Known
Water	None Known	None Known	None Known	None Known

Chemical Name	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Manganese sulfate monohydrate	None Known	None Known	None Known
Water	None Known	None Known	None Known

12. ECOLOGICAL INFORMATION

Ecotoxicity

Chemical Name	Toxicity to Algae	Toxicity to Fish	Microtox	Daphnia Magna (Water Flea)
Manganese sulfate monohydrate	None Known	None Known	None Known	None Known
Water	None Known	None Known	None Known	None Known

Chemical Name	Log Pow
Manganese sulfate monohydrate	None Known
Water	None Known

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method Dispose of in accordance with local regulations.

Chemical Name
Manganese sulfate monohydrate - 10034-96-5
Water - 7732-18-5

Chemical Name	RCRA - Halogenated Organic Compounds	RCRA - P Series Wastes	RCRA - F Series Wastes	RCRA - K Series Wastes
Manganese sulfate monohydrate - 10034-96-5	None Known	None Known	None Known	None Known
Water - 7732-18-5	None Known	None Known	None Known	None Known

14. TRANSPORT INFORMATION

DOT Not regulated

IATA Not regulated

IMDG/IMO Not regulated

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Manganese sulfate monohydrate 10034-96-5 (36)	TSCA	DSL	EINECS/ELINCS	ENCS	X	KECL	X	X
Water 7732-18-5 (to 100%)	Present	X	X	ENCS	X	KE-35400	X	X

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

Chemical Name	CAS-No	Weight %	SARA 313 - Threshold Values %
Manganese sulfate monohydrate	10034-96-5	36	1.0
Water	7732-18-5	to 100%	None Known

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Component	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Manganese sulfate monohydrate 10034-96-5 (36)	None Known	None Known	None Known	None Known
Water 7732-18-5 (to 100%)	None Known	None Known	None Known	None Known

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

This product contains the following HAPs: .

Chemical Name	CAS-No	Weight %	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Manganese sulfate monohydrate	10034-96-5	36	Present (includes any unique chemical substance that contains Manganese as part of its infrastructure)	None Known	None Known	None Known
Water	7732-18-5	to 100%	None Known	None Known	None Known	None Known

CERCLA

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs
Manganese sulfate monohydrate	None Known	None Known
Water	None Known	None Known

U.S. State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals

Chemical Name	CAS-No	California Prop. 65
Manganese sulfate monohydrate	10034-96-5	None Known
Water	7732-18-5	None Known

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Manganese sulfate monohydrate	None Known	X	X	X	None Known
Water	None Known	None Known	None Known	None Known	None Known

International Regulations

Mexico - Grade

Chemical Name	Carcinogen Status	Exposure Limits

Manganese sulfate monohydrate	None Known	Mexico: TWA= 0.2 mg/m^3
Water	None Known	None Known

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
Non-controlled

16. OTHER INFORMATION

NFPA	HMIS	PPE	Transport Symbol
	Health Hazard 2 Fire Hazard 0 Reactivity 0		

Prepared By	Regulatory Affairs Department
Issuing Date	12/15/2010
Revision Date	
Revision Note	Initial Release.

Disclaimer
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End of MSDS

MSDS

MATERIAL SAFETY DATA SHEET

P.O. Box 329 - 802 Washington Avenue Chestertown, MD 21620 - USA
TELEPHONE # FOR INFORMATION 410 778-3100
24 HOUR EMERGENCY NUMBER (CHEM-TEL): USA, Canada, Puerto Rico 800-255-3924;
Outside North American Continent 813-248-0585 (call Collect)

1. Product Identification

Product Code: **4169**
Product Description: Sodium Thiosulfate, .025 N

Manufactured By: LaMotte Company
802 Washington Avenue
Chestertown, MD 21620

2. Composition/Information On Ingredients

Hazard	CAS#/Name	%	PEL	TLV
	1310-73-2 Sodium Hydroxide	<0.1		
	10102-17-7 Sodium Thiosulfate, 5-hydrate	<1		
	7732-18-5 Water	to 100%		

3. Hazards Overview

Primary Route Of Entry: Ingestion Skin

Large doses by mouth can cause GI irritation. May cause skin irritation.

HMIS Hazard

Scale: 4 = Extreme, 3 = High, 2 = Moderate, 1= Slight, 0 = Least

Health: 1 **Flammability:** 0 **Reactivity:** 0

Carcinogenicity: None

Other Health Related Comments:

Product Code: 4169 **Product Description:** Sodium Thiosulfate, .025 N

4. First Aid Measures

Eye Contact: Flush with water for 15 minutes.

Skin Contact: Flush with water. Wash with soap and water.

Ingestion: Drink plenty of water. Consult a physician if symptoms appear.

Inhalation: N/A

5. Fire Fighting Measures

Flash Point (Method Used): N/A **LEL:** N/A **UEL:** N/A

Extinguishing Media: Not a fire hazard

Special Fire Fighting Procedures: N/A

Unusual Fire & Explosion Hazard: N/A

6. Accidental Release Measures

Neutralize with vinegar or other dilute acid and mop up.

7. Handling & Storage

Store in cool, dry, storage area away from heat and light.

Product Code: 4169 **Product Description:** Sodium Thiosulfate, .025 N

8. Exposure Controls/Personal Protection

Ventilation

Normal

Protection When Handling

Eye Protection Gloves

Work/Hygenic Practices: Avoid repeated contact with eyes or skin. Solution is alkaline and may be irritating.

9. Physical & Chemical Properties

Appearance:	Clear Colorless Liquid	**Vapor Density:**	<1 (Air=1)
Solubility In Water:	Soluble	**Vapor Pressure:**	<17 mm @ 20 deg C
Odor:	None	**Boiling Point:**	ca. 100 degC
pH:	12	**Melting Point:**	Unknown

10. Stability & Reactivity

Stable:	Yes
Conditions To Avoid:	Heat, light
Incompatibility (Materials To Avoid):	N/A
Hazardous Decomposition Products:	N/A

11. Toxicological Information

Non-toxic

Target Organs: N/A

Product Code: 4169 **Product Description:** Sodium Thiosulfate, .025 N

12. Ecological Information

Information Not Yet Available

13. Disposal Considerations

Neutralize with dilute acid and wash down drain with excess water.

14. Transportation Information

Not Regulated For Transport

15. Regulatory Information

Chemical Inventory Status

Hazard	Ingredient	USA TSCA	Europe EC	--- Canada --- DSL	NDSL	Australia	Japan

Federal, State, & International Regulations

Ingredient	--- SARA 302 --- RQ	TPQ	--------- SARA 313 --------- Listed	Chemical Category	CERCLA	RCRA 261.33	TSCA 8(D)

Product Code: 4169 **Product Description:** Sodium Thiosulfate, .025 N

Ingredient	--- SARA 311/312 --- Hazard Categories Acute	Chronic	Fire	Pressure	Reactivity	-------- Australia ------- Hazchem Code	Poison Schedule	This MSDS Is WHMIS Compliant
product 4169 as a whole	No	No	No	No	No	None Allocated	None Allocated	Yes

16. Other Information

Store away from heat and light.

Prepared By: Regulatory Affairs Department

Revised: 7/11/2009

Material Safety Data Sheet

LaMotte

Issuing Date 12/27/2010 **Revision Number** 0

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name **Starch Indicator Solution**

Product Code(s) 4170

Recommended Use Test kit reagent. Laboratory chemicals. Industrial (not for food or food contact use).

Company
LaMotte Company, Inc.
802 Washington Avenue
P.O. Box 329
Chestertown, MD 21620
USA

Emergency Telephone Number
24 Hour Emergency Number (CHEM-TEL):
USA, Canada, Puerto Rico 1-800-255-3924
Outside North American Continent (Call collect) 813-248-0585

2. HAZARDS IDENTIFICATION

Emergency Overview

Avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes, and clothing
May be harmful if swallowed
May cause eye irritation

Appearance Colorless **Physical State** Liquid **Odor** None

OSHA Regulatory Status While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Potential Health Effects
Principle Routes of Exposure Skin and eye contact

Acute Toxicity
- **Eyes** Contact with eyes may cause irritation.
- **Skin** No hazard from product as supplied.
- **Inhalation** Not an expected route of exposure.
- **Ingestion** May cause gastrointestinal discomfort if consumed in large amounts.

Chronic Effects Prolonged skin contact may cause skin irritation and/or dermatitis.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Weight %
Soluble Starch (Amylodextrin)	9005-84-9	0.5
Salicylic acid	69-72-7	0.13
Water	7732-18-5	to 100%

4. FIRST AID MEASURES

General Advice Do not get in eyes, on skin, or on clothing.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If irritation persists or develops, contact a physician.

Skin Contact Wash off with warm water and soap. If skin irritation persists, call a physician.

Inhalation Not expected.

Ingestion Drink plenty of water. Do not induce vomiting without medical advice (pH 3). Consult a physician. Never give anything by mouth to an unconscious person.

Protection of First-aiders Use personal protective equipment. See Section 8 for more detail. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

5. FIRE-FIGHTING MEASURES

Flammable Properties Not a fire hazard.

Flash Point Not applicable

Suitable Extinguishing Media Dry chemical, CO_2, alcohol-resistant foam or water spray.

Explosion Data
NFPA **Health Hazard** 0 **Flammability** 0 **Stability** 0 **Physical and Chemical Hazards** -

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Use personal protective equipment. Refer to Section 8. Avoid contact with skin, eyes, and clothing.

Methods for Cleaning Up Neutralize spill with alkaline material (sodium bicarbonate), being careful to prevent splattering, then containerize slurry and hold for later disposal. If local regulations permit, dilute slurry with water and rinse to drain with excess water.. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling Handle in accordance with good industrial hygiene and safety practice. Prevent contact with skin, eyes, and clothing. Do not ingest. Do not eat, drink, or smoke when using this product.

Storage Keep containers tightly closed in a dry, cool, and well-ventilated place. Store at room temperature. Keep away from direct sunlight. Keep away from heat and incompatibles. Keep out of the reach of children.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Soluble Starch (Amylodextrin) 9005-84-9	None Known	None Known	None Known
Salicylic acid 69-72-7	None Known	None Known	None Known
Water 7732-18-5	None Known	None Known	None Known

Personal Protective Equipment

Eye/Face Protection	Safety glasses with side-shields.
Skin and Body Protection	Wear protective gloves/clothing.
Respiratory Protection	When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Colorless	**Odor**	None
Physical State	Liquid	**pH**	3
Flash Point	Not applicable	**Boiling Point/Range**	ca. 100 °C / 212 °F
Vapor Pressure	<17 mmHg @ 20°C	**Vapor Density**	<1(Air = 1)

10. STABILITY AND REACTIVITY

Stability	Stable under normal conditions of use and storage.
Incompatible Products	Strong oxidizing agents. Iron salts.
Conditions to Avoid	Excessive heat. Incompatible products. Direct sunlight.
Hazardous Decomposition Products	Carbon monoxide (CO).
Hazardous Polymerization	Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Soluble Starch (Amylodextrin)	None Known	None Known	None Known
Salicylic acid	891 mg/kg (Rat)	2000 mg/kg (Rabbit) 2000 mg/kg (Rat)	0.9 mg/L (Rat) 1 h
Water	90 mL/kg (Rat)	None Known	None Known

Chronic Toxicity

Chronic Toxicity Prolonged skin contact may cause skin irritation and/or dermatitis.

Chemical Name	ACGIH	IARC	NTP	OSHA
Soluble Starch (Amylodextrin)	None Known	None Known	None Known	None Known
Salicylic acid	None Known	None Known	None Known	None Known
Water	None Known	None Known	None Known	None Known

Chemical Name	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Soluble Starch (Amylodextrin)	None Known	None Known	None Known
Salicylic acid	None Known	None Known	None Known
Water	None Known	None Known	None Known

12. ECOLOGICAL INFORMATION

Ecotoxicity

Chemical Name	Toxicity to Algae	Toxicity to Fish	Microtox	Daphnia Magna (Water Flea)
Soluble Starch (Amylodextrin)	None Known	None Known	None Known	None Known
Salicylic acid	None Known	None Known	EC50 = 138 mg/L 1 h EC50 = 214 mg/L 5 min EC50 = 552 mg/L 1 h EC50 = 78 mg/L 210 min	EC50 = 105 mg/L 24 h
Water	None Known	None Known	None Known	None Known

Chemical Name	Log Pow
Soluble Starch (Amylodextrin)	None Known
Salicylic acid	0 - 2.26 37 °C
Water	None Known

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method Dispose according to federal, state, and local regulations. If permitted, neutralize reagent with sodium bicarbonate/sodium carbonate, add slurry to large volume of water to dilute, rinse to drain with excess water.

Chemical Name
Soluble Starch (Amylodextrin) - 9005-84-9
Salicylic acid - 69-72-7
Water - 7732-18-5

Chemical Name	RCRA - Halogenated Organic Compounds	RCRA - P Series Wastes	RCRA - F Series Wastes	RCRA - K Series Wastes
Soluble Starch (Amylodextrin) - 9005-84-9	None Known	None Known	None Known	None Known
Salicylic acid - 69-72-7	None Known	None Known	None Known	None Known
Water - 7732-18-5	None Known	None Known	None Known	None Known

14. TRANSPORT INFORMATION

DOT Not regulated

IATA Not regulated

IMDG/IMO Not regulated

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Soluble Starch (Amylodextrin) 9005-84-9 (0.5)	XU	X	X	ENCS	X	KE-01773	X	X
Salicylic acid 69-72-7 (0.13)	Present	X	X	3-1640	X	KE-20367	X	X
Water 7732-18-5 (to 100%)	Present	X	X	ENCS	X	KE-35400	X	X

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Chemical Name	CAS-No	Weight %	SARA 313 - Threshold Values %
Soluble Starch (Amylodextrin)	9005-84-9	0.5	None Known
Salicylic acid	69-72-7	0.13	None Known
Water	7732-18-5	to 100%	None Known

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Component	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Soluble Starch (Amylodextrin) 9005-84-9 (0.5)	None Known	None Known	None Known	None Known
Salicylic acid 69-72-7 (0.13)	None Known	None Known	None Known	None Known
Water 7732-18-5 (to 100%)	None Known	None Known	None Known	None Known

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

.

Chemical Name	CAS-No	Weight %	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Soluble Starch (Amylodextrin)	9005-84-9	0.5	None Known	None Known	None Known	None Known
Salicylic acid	69-72-7	0.13	None Known	Group III	None Known	None Known
Water	7732-18-5	to 100%	None Known	None Known	None Known	None Known

CERCLA

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs
Soluble Starch (Amylodextrin)	None Known	None Known
Salicylic acid	None Known	None Known
Water	None Known	None Known

U.S. State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals

Chemical Name	CAS-No	California Prop. 65
Soluble Starch (Amylodextrin)	9005-84-9	None Known
Salicylic acid	69-72-7	None Known
Water	7732-18-5	None Known

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island

Soluble Starch (Amylodextrin)	None Known	None Known	None Known	None Known	None Known
Salicylic acid	None Known	None Known	None Known	None Known	None Known
Water	None Known	None Known	None Known	None Known	None Known

International Regulations

Mexico - Grade

Chemical Name	Carcinogen Status	Exposure Limits
Soluble Starch (Amylodextrin)	None Known	None Known
Salicylic acid	None Known	None Known
Water	None Known	None Known

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
Non-controlled

16. OTHER INFORMATION

NFPA	HMIS	PPE	Transport Symbol
	Health Hazard 1 Fire Hazard 0 Reactivity 0		Not regulated

Prepared By	Regulatory Affairs Department
Issuing Date	12/27/2010
Revision Date	
Revision Note	Initial Release.

Disclaimer
The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

Material Safety Data Sheet

LaMotte

Issuing Date 12/10/2010 **Revision Number** 0

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name **Sulfuric Acid, 1:1**

Product Code(s) 6141

Recommended Use Laboratory chemicals. Industrial (not for food or food contact use).

Company
LaMotte Company, Inc.
802 Washington Avenue
P.O. Box 329
Chestertown, MD 21620
USA

Emergency Telephone Number
24 Hour Emergency Number (CHEM-TEL):
USA, Canada, Puerto Rico 1-800-255-3924
Outside North American Continent (Call collect) 813-248-0585

2. HAZARDS IDENTIFICATION

DANGER! POISON!

Emergency Overview

Corrosive
Liquid and mist can cause severe burns to all body tissue
May be fatal if inhaled, or swallowed
Water reactive

Appearance Clear, colorless solution **Physical State** Liquid **Odor** Odorless

OSHA Regulatory Status This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200). Safety information is given for exposure to the reagent as sold and considers exposure to the chemical if user has direct eye and skin contact.

Potential Health Effects
Principle Routes of Exposure Inhalation, skin contact, and ingestion

Acute Toxicity

Eyes Corrosive to the eyes and may cause severe damage including blindness.

Skin Corrosive. Can cause redness, pain, and severe skin burns . May discolor the skin. Harmful if absorbed through skin.

Inhalation Poison - may be fatal if inhaled. Inhalation of corrosive mist may cause coughing, choking, headache, dizziness, and weakness for several hours. Pulmonary edema may occur with tightness in the chest, shortness of breath, bluish skin, decreased blood pressure, and increased heart rate.

Ingestion Corrosive. Causes burns. May be fatal if swallowed. Can cause immediate pain and burning in the mouth, throat, esphagus and GI tract. May cause nausea, vomiting, and diarrhea, and in severe cases death.

Chronic Effects Chronic exposure to corrosive mists or vapors may cause erosion of the teeth. Chronic exposure to mists containing sulfuric acid is a cancer hazard.

Aggravated Medical Conditions Hypersensitivity may occur in those with preexisting skin disorders. Respiratory disorders. Preexisting eye disorders.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Weight %
Sulfuric acid	7664-93-9	64
Water	7732-18-5	to 100%

4. FIRST AID MEASURES

General Advice Do not get in eyes, on skin, or on clothing. Do not breathe dust/fume/gas/mist/vapors/spray.

Eye Contact Immediately flush eyes with gentle stream of water for at least 15 minutes, occasionally lifting upper and lower eyelids. Call a physician immediately.

Skin Contact Wash off immediately with soap and plenty of water for at least 15 minutes while removing all contaminated clothing and shoes. Excess acid on skin can be neutralized with a 2% solution of sodium bicarbonate in water.. Call a physician immediately.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration and contact emergency personnel. Call a physician immediately.

Ingestion DO NOT INDUCE VOMITING. Drink plenty of water. Clean mouth with water. Call a physician immediately. Never give anything by mouth to an unconscious person.

Protection of First-aiders Use personal protective equipment. See Section 8 for more detail. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

5. FIRE-FIGHTING MEASURES

Flammable Properties Not flammable.

Flash Point Not applicable

Suitable Extinguishing Media Dry chemical or CO_2. DO NOT USE WATER.

Explosion Data

Specific Hazards Arising from the Chemical

Contact with metals may evolve flammable hydrogen gas. React vigorously with water.

NFPA **Health Hazard** 3 **Flammability** 0 **Stability** 2 **Physical and Chemical Hazards** W

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Ensure adequate ventilation. Avoid contact with skin, eyes and inhalation of vapors. Use personal protective equipment. Refer to Section 8.

Methods for Cleaning Up Neutralize spill with alkaline material (sodium bicarbonate), being careful to prevent splattering, then containerize slurry and hold for later disposal. If local regulations permit, dilute slurry with water and rinse to drain with excess water.. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling Handle in accordance with good industrial hygiene and safety practice. Prevent contact with skin, eyes and clothing. Do not ingest. Do not eat, drink or smoke when using this product.

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from incompatible materials such as cyanides or sulfides.. Store away from strong bases or metals. Do not store near combustible materials. Keep out of the reach of children.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Sulfuric acid 7664-93-9	TWA: 0.2 mg/m^3	TWA: 1 mg/m^3	IDLH: 15 mg/m^3 TWA: 1 mg/m^3
Water 7732-18-5	None Known	None Known	None Known

Engineering Measures Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/Face Protection Safety glasses with side-shields.

Skin and Body Protection Wear protective gloves/clothing.

Respiratory Protection When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice. Do not eat, drink or smoke when using this product. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear, colorless solution	**Odor**	Odorless
Physical State	Liquid	**pH**	<1
Flash Point	Not applicable	**Autoignition Temperature**	Not applicable
Boiling Point/Range	<100 °C / 214 °F	**Flammability Limits in Air**	Not applicable
Specific Gravity	~3.4 (water = 1)	**Vapor Pressure**	No information available
Vapor Density	No information available		

10. STABILITY AND REACTIVITY

Stability Stable under normal conditions of use and storage.

Incompatible Products Water. Strong bases. Metals. Combustible materials. Cyanides. Sulfides. Formaldehyde.

Conditions to Avoid Excessive heat. Incompatible products. Direct sunlight.

Hazardous Decomposition Products Hydrogen gas. Sulfur oxides.

Hazardous Reactions Reacts violently with water. Contact with metals may evolve flammable hydrogen gas.

Hazardous Polymerization Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sulfuric acid	2140 mg/kg (Rat)	None Known	510 mg/m^3(Rat) 2 h

Water	90 mL/kg (Rat)	None Known	None Known

Chronic Toxicity

Chronic Toxicity Chronic exposure to corrosive mists or vapors may cause erosion of the teeth. Chronic exposure to mists containing sulfuric acid is a cancer hazard.

Chemical Name	ACGIH	IARC	NTP	OSHA
Sulfuric acid	A2	Group 1	Known	X
Water	None Known	None Known	None Known	None Known

Chemical Name	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Sulfuric acid	None Known	None Known	None Known
Water	None Known	None Known	None Known

12. ECOLOGICAL INFORMATION

Ecotoxicity

The material may be toxic to aquatic life.

Chemical Name	Toxicity to Algae	Toxicity to Fish	Microtox	Daphnia Magna (Water Flea)
Sulfuric acid	None Known	LC50> 500 mg/L Brachydanio rerio 96 h	None Known	EC50 = 29 mg/L 24 h
Water	None Known	None Known	None Known	None Known

Bioaccumulation/Accumulation When released into the soil, this material may leach into ground water. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet or dry deposition.

Chemical Name	Log Pow
Sulfuric acid	None Known
Water	None Known

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method Dispose according to federal, state, and local regulations. If permitted, neutralize reagent with sodium bicarbonate/sodium carbonate, add slurry to large volume of water to dilute, rinse to drain with excess water.

Chemical Name
Sulfuric acid - 7664-93-9
Water - 7732-18-5

Chemical Name	RCRA - Halogenated Organic Compounds	RCRA - P Series Wastes	RCRA - F Series Wastes	RCRA - K Series Wastes
Sulfuric acid - 7664-93-9	None Known	None Known	None Known	None Known
Water - 7732-18-5	None Known	None Known	None Known	None Known

14. TRANSPORT INFORMATION

DOT

Proper Shipping Name	SULFURIC ACID (> 51%ACID)
Hazard Class	8
UN-No	1830
Packing Group	II

Reportable Quantity (RQ) 1000

IATA

UN-No 1830
Proper Shipping Name SULFURIC ACID (>51% ACID)
Hazard Class 8
Packing Group II

IMDG/IMO

Proper Shipping Name SULFURIC ACID
Hazard Class 8
UN-No 1830
Packing Group II

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Sulfuric acid 7664-93-9 (64)	Present	X	X	1-430; 1-724	X	KE-32570	X	X
Water 7732-18-5 (to 100%)	Present	X	X	ENCS	X	KE-35400	X	X

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

Chemical Name	CAS-No	Weight %	SARA 313 - Threshold Values %
Sulfuric acid	7664-93-9	64	1.0
Water	7732-18-5	to 100%	None Known

SARA 311/312 Hazard Categories

Acute Health Hazard Yes
Chronic Health Hazard Yes
Fire Hazard No
Sudden Release of Pressure Hazard No
Reactive Hazard Yes

Clean Water Act
This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Component	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Sulfuric acid 7664-93-9 (64)	1000 lb	None Known	None Known	X
Water 7732-18-5 (to 100%)	None Known	None Known	None Known	None Known

Chemical Name	CAS-No	Weight %	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Sulfuric acid	7664-93-9	64	None Known	None Known	None Known	None Known
Water	7732-18-5	to 100%	None Known	None Known	None Known	None Known

CERCLA

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs
Sulfuric acid	1000 lb	1000 lb
Water	None Known	None Known

U.S. State Regulations

California Proposition 65
Warning! California Proposition 65 has classified "strong inorganic acid mists containing sulfuric acid" as a chemical known to the State of California to cause cancer. This classification applies only to "mists" containing sulfuric acid and not to sulfuric acid or sulfuric acid solutions, as is this solution.

Chemical Name	CAS-No	California Prop. 65
Sulfuric acid	7664-93-9	Carcinogen
Water	7732-18-5	None Known

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Sulfuric acid	X	X	X	X	X
Water	None Known	None Known	None Known	None Known	None Known

International Regulations

Mexico - Grade

Chemical Name	Carcinogen Status	Exposure Limits
Sulfuric acid	A2	Mexico: TWA= 1 mg/m^3
Water	None Known	None Known

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
E Corrosive material
D1A Very toxic materials

Chemical Name	NPRI
Sulfuric acid	X

16. OTHER INFORMATION

NFPA	HMIS	PPE	Transport Symbol

Health Hazard	3
Fire Hazard	0
Reactivity	2

Prepared By	Regulatory Affairs Department
Issuing Date	12/10/2010
Revision Date	
Revision Note	Initial Release.

Disclaimer
The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS

MSDS – pH

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

MSDS No: M00385

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Wide Range 4 pH Indicator Solution
Catalog Number: 2329332

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00385
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
Hazard: Flammable. Causes irritation.
Date of MSDS Preparation:
Day: 01
Month: April
Year: 2012

2. COMPOSITION / INFORMATION ON INGREDIENTS

Demineralized Water
CAS No.: 7732-18-5
TSCA CAS Number: 7732-18-5
Percent Range: 45.0 - 55.0
Percent Range Units: volume / volume
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: No effects anticipated.

Other components, each
CAS No.: Not applicable
TSCA CAS Number: Not applicable
Percent Range: < 0.1
Percent Range Units: volume / volume
LD50: Not applicable
LC50: Not applicable
TLV: Not established
PEL: Not established
Hazard: Any ingredient(s) of this product listed as "Other component(s)" is not considered a health hazard to the user of this product.

Isopropanol
CAS No.: 67-63-0
TSCA CAS Number: 67-63-0
Percent Range: 45.0 - 55.0
Percent Range Units: volume / volume
LD50: Oral rat LD50 = 5045 mg/kg Oral Human LDLo = 2770 mg/kg
LC50: Inhalation rat LCLo = 12000 ppm/8hr

TLV: 400 ppm (500 ppm STEL)
PEL: 400 ppm
Hazard: Flammable. Causes moderate eye irritation.

3. HAZARDS IDENTIFICATION

Emergency Overview:
Appearance: Dark green liquid
Odor: Alcoholic
MAY CAUSE EYE, SKIN AND RESPIRATORY TRACT IRRITATION
FLAMMABLE LIQUID AND VAPOR
HMIS:
Health: 1
Flammability: 4
Reactivity: 0
Protective Equipment: X - See protective equipment, Section 8.
NFPA:
Health: 1
Flammability: 3
Reactivity: 0
Symbol: Not applicable
Potential Health Effects:
Eye Contact: Causes moderate irritation
Skin Contact: May cause irritiation
Skin Absorption: No effects anticipated
Target Organs: Not applicable
Ingestion: May cause: drowsiness dizziness incoordination giddiness depression headache abdominal pain nausea vomiting diarrhea blood pressure changes rapid pulse and respirations respiratory arrest coma death
Target Organs: Central nervous system
Inhalation: May cause: respiratory tract irritation Effects similar to those of ingestion.
Target Organs: Central nervous system
Medical Conditions Aggravated: Pre-existing: Eye conditions Skin conditions Respiratory conditions
Chronic Effects: No effects anticipated
Cancer / Reproductive Toxicity Information:
This product does NOT contain any OSHA listed carcinogens.
This product does NOT contain any IARC listed chemicals.
This product does NOT contain any NTP listed chemicals.
Additional Cancer / Reproductive Toxicity Information: Contains: an experimental teratogen.
Toxicologically Synergistic Products: None reported

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.
Skin Contact (First Aid): Wash skin with plenty of water. Call physician if irritation develops.
Ingestion (First Aid): Give large quantities of water. Call physician immediately.
Inhalation: Remove to fresh air.

5. FIRE FIGHTING MEASURES

Flammable Properties: Flammable Liquid
Flash Point: 21°C; 70°F
Method: Closed cup
Flammability Limits:
Lower Explosion Limits: Not available
Upper Explosion Limits: Not available
Autoignition Temperature: Not available
Hazardous Combustion Products: Toxic fumes of: carbon monoxide, carbon dioxide.
Fire / Explosion Hazards: Flammable Liquid Do not expose to sparks or other ignition sources. May react violently with: strong oxidizers
Static Discharge: None reported.

Mechanical Impact: None reported
Extinguishing Media: Water. Dry chemical. Alcohol foam. Carbon dioxide
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear. Containers can build up pressure if exposed to heat.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance. Outside of the US, only persons properly qualified according to state or local regulations should respond to a spill involving chemicals.
Containment Technique: Remove all combustible material from spill area. Remove all ignition and spark-creating sources from the spill area. Cover spilled liquid with a commercially available flammable liquid sorbent such as vapor barrier blanket or activated carbon to avoid evolution of fumes. Vapors may travel to a source of ignition and flash back. May be ignited by: heat, sparks, or flames. Dike the material to create a barrier to combustibles.
Clean-up Technique: Eliminate all sources of ignition. Do not breathe the fumes. Cover with an inert material, such as sand. Use only non-sparking tools. Sweep up material. Incinerate material at a government approved hazardous waste facility. Decontaminate the area of the spill with a soap solution.
Evacuation Procedure: Evacuate general area (50 foot radius or as directed by your facility's emergency response plan) when: any quantity is spilled. If conditions warrant, increase the size of the evacuation.
Special Instructions (for accidental release): Product is regulated as RCRA hazardous waste in the U.S.
304 EHS RQ (40 CFR 355): Not applicable
D.O.T. Emergency Response Guide Number: 129

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin clothing Do not breathe mist or vapors. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.
Storage: Store away from: oxidizers sparks, flames and other ignition sources Protect from: heat Store between 10° and 25°C.
Flammability Class: Class IB

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Maintain general industrial hygiene practices when using this product. Maintain adequate ventilation to keep vapor level below TWA for chemicals in this product.
Personal Protective Equipment:
Eye Protection: chemical splash goggles
Skin Protection: disposable latex gloves In the EU, the selected gloves must satisfy the specifications of EU Directive 89/686/EEC and standard EN 374 derived from it. lab coat
Inhalation Protection: adequate ventilation
Precautionary Measures: Avoid contact with: eyes skin clothing Do not breathe: mist/vapor Wash thoroughly after handling. Protect from: heat sparks, flames and other ignition sources Keep away from: oxidizers
TLV: Not established
PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: Dark green liquid
Physical State: Liquid
Molecular Weight: Not applicable
Odor: Alcoholic
pH: 8.7
Vapor Pressure: Not available
Vapor Density (air = 1): Not available
Boiling Point: 79°C; 174°F
Melting Point: -26°C; -15°F
Specific Gravity/ Relative Density (water = 1; air =1): 0.922
Evaporation Rate (water = 1): 5.45

Volatile Organic Compounds Content: Not available
Partition Coefficient (n-octanol / water): Not applicable
Solubility:
Water: Miscible
Acid: Miscible
Other: Not determined
Metal Corrosivity:
Steel: 0.003 in/yr
Aluminum: 0.000 in/yr

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.
Conditions to Avoid: Contact with heat, sparks, open flames or other ignition sources. Extreme temperatures
Reactivity / Incompatibility: Incompatible with: oxidizers potassium-tert-butoxide cobalt chloride nitro compounds oleum
Hazardous Decomposition: Heating to decomposition releases toxic fumes of carbon monoxide and carbon dioxide.
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:
LD50: None reported
LC50: None reported
Dermal Toxicity Data: Isopropanol Skin rabbit LD50 = 12800 mg/kg
Skin and Eye Irritation Data: Isopropanol - Skin rabbit 500 mg MILD; Eye rabbit 100 mg/24 H MODERATE
Mutation Data: Isopropanol - Cytogenetic analysis, rat, inhalation, 1030 $\mu g/m^3$/16W (intermittent)
Reproductive Effects Data: Isopropanol - Oral rat TDLo = 11340 mg/kg - Maternal effects - menstrual cycle changes or disorders; Oral rat TDLo 5040 mg/kg - Litter size
Ingredient Toxicological Data: Isopropanol Oral rat LD50 = 5045 mg/kg; Isopropanol Inhalation rat LCLo = 12000 ppm/8H

12. ECOLOGICAL INFORMATION

Product Ecological Information: --
No ecological data available for this product. Mobility in soil: No data available
Ingredient Ecological Information: --
No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

EPA Waste ID Number: D001
Special Instructions (Disposal): Incinerate material at an E.P.A. approved hazardous waste facility.
Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

D.O.T.:
D.O.T. Proper Shipping Name: Isopropanol Solution
--
DOT Hazard Class: 3
DOT Subsidiary Risk: NA
DOT ID Number: UN1219
DOT Packing Group: II
I.C.A.O.:
I.C.A.O. Proper Shipping Name: Isopropanol Solution
--
ICAO Hazard Class: 3

ICAO Subsidiary Risk: NA
ICAO ID Number: UN1219
ICAO Packing Group: II
I.M.O.:
I.M.O. Proper Shipping Name: Isopropanol Solution
--
I.M.O. Hazard Class: 3
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: UN1219
I.M.O. Packing Group: II
Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

U.S. Federal Regulations:
O.S.H.A.: This product meets the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)
E.P.A.:
S.A.R.A. Title III Section 311/312 Categorization (40 CFR 370): Immediate (Acute) Health Hazard Fire Hazard
S.A.R.A. Title III Section 313 (40 CFR 372): This product does NOT contain any chemical subject to the reporting requirements of Section 313 of Title III of SARA.
--
302 (EHS) TPQ (40 CFR 355): Not applicable
304 CERCLA RQ (40 CFR 302.4): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
Clean Water Act (40 CFR 116.4): Not applicable
RCRA: Contains RCRA regulated substances. See Section 13, EPA Waste ID Number.
C.P.S.C.: Not applicable
State Regulations:
California Prop. 65: No Prop. 65 listed chemicals are present in this product.
Identification of Prop. 65 Ingredient(s): None
California Perchlorate Rule CCR Title 22 Chap 33: Not applicable
Trade Secret Registry: Not applicable
National Inventories:
U.S. Inventory Status: All ingredients in this product are listed on the TSCA 8(b) Inventory (40 CFR 710).
TSCA CAS Number: Not applicable

16. OTHER INFORMATION

Intended Use: Laboratory Reagent Indicator for pH
References: 29 CFR 1900 - 1910 (Code of Federal Regulations - Labor). Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. CCINFO RTECS. Canadian Centre for Occupational Health and Safety. Hamilton, Ontario Canada: 30 June 1993. Gosselin, R. E. et al. Clinical Toxicology of Commercial Products, 5th Ed. Baltimore: The Williams and Wilkins Co., 1984. List of Dangerous Substances Classified in Annex I of the EEC Directive (67/548) - Classification, Packaging and Labeling of Dangerous Substances, Amended July 1992. Vendor Information. Fire Protection Guide on Hazardous Materials, 10th Ed. Quincy, MA: National Fire Protection Fire Protection Guide on Hazardous Materials, 10th Ed. Quincy, MA: National Fire Protection Association, 1991. In-house information.
Revision Summary: Substantial revision to comply with EU Reg 1272/2008, Reg 1907/2006 and UN GHS (ST/SG/AC.10/36/Add.3).

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

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LaMotte

Material Safety Data Sheet

Issuing Date 9/9/2011 **Revision Number** 0

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name WIDE RANGE INDICATOR

Product Code(s) 2218

Synonyms none

Recommended Use Test kit reagent. Industrial (not for food or food contact use). Laboratory chemicals.

Company
LaMotte Company, Inc.
802 Washington Avenue
P.O. Box 329
Chestertown, MD 21620
USA

Emergency Telephone Number
24 Hour Emergency Number (CHEM-TEL):
USA, Canada, Puerto Rico 1-800-255-3924
Outside North American Continent (Call collect) 813-248-0585

2. HAZARDS IDENTIFICATION

POISON! DANGER!

Emergency Overview

Flammable liquid and vapor
Harmful by inhalation, in contact with skin and if swallowed
May be fatal or cause blindness if swallowed
Affects central nervous system
May cause skin and eye irritation

Appearance Dark green **Physical State** Liquid **Odor** Alcohol

Potential Health Effects

Principle Routes of Exposure Skin contact, Ingestion, and, Inhalation.

Acute Toxicity

Eyes May cause irritation.

Skin Irritating to skin. Prolonged skin contact may defat the skin and produce dermatitis.

Inhalation May cause irritation of respiratory tract. May cause central nervous system depression with nausea, headache, dizziness, vomiting, and incoordination.

Ingestion May cause drowsiness and dizziness. May be fatal or cause blindness if swallowed. May cause central nervous system depression.

Chronic Effects

Ethanol has been shown to be a reproductive toxin only when consumed as an alcoholic beverage Prolonged skin contact may cause skin irritation and/or dermatitis

Environmental Hazard Harmful to aquatic organisms.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Weight %
Methyl red	493-52-7	<0.05
Phenolphthalein	77-09-8	<0.05
Bromothymol blue	76-59-5	<0.05
Thymol blue	76-61-9	<0.05
Potassium hydroxide	1310-58-3	<0.05
2,4-Dinitrophenol	51-28-5	0.05
Methyl alcohol	67-56-1	2
Ethyl alcohol	64-17-5	52
Water	7732-18-5	to 100%

4. FIRST AID MEASURES

General Advice Do not get in eyes, on skin, or on clothing. Consult a physician.

Eye Contact Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Consult a physician.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration and contact emergency personnel. Call a physician immediately.

Ingestion Drink 1 or 2 glasses of water. Induce vomiting, but only if victim is fully conscious. Call a physician immediately.

Protection of First-aiders Use personal protective equipment. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

5. FIRE-FIGHTING MEASURES

Flammable Properties Flammable.
Flash Point 23°C (74°F) CC

Suitable Extinguishing Media Water spray, dry chemical, carbon dioxide (CO_2), or foam.

Explosion Data

NFPA	**Health Hazard** 1	**Flammability** 3	**Stability** 0	**Physical and Chemical Hazards** -
HMIS	**Health Hazard** 2	**Flammability** 3	**Stability** 0	

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Refer to Section 8. Ensure adequate ventilation. Remove all sources of ignition.

Methods for Containment Absorb spill with inert material (e.g. dry sand or earth), then place in a chemical waste container. Dispose according to federal, state, and local regulations.

Methods for Cleaning Up After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling Handle in accordance with good industrial hygiene and safety practice. Prevent contact with skin, eyes, and clothing. Do not ingest. Do not eat, drink, or smoke when using this product.

Storage Keep containers tightly closed in a dry, cool, and well-ventilated place. Keep away from heat and sources of ignition. Do not store near combustible materials. Keep out of the reach of children.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Methyl red 493-52-7	None Known	None Known	None Known
Phenolphthalein 77-09-8	None Known	None Known	None Known
Bromothymol blue 76-59-5	None Known	None Known	None Known
Thymol blue 76-61-9	None Known	None Known	None Known
Potassium hydroxide 1310-58-3	None Known	None Known	Ceiling: 2 mg/m^3
2,4-Dinitrophenol 51-28-5	None Known	None Known	None Known
Methyl alcohol 67-56-1	= 250 ppm STEL TWA: 200 ppm	TWA: 200 ppm TWA: 260 mg/m^3	IDLH: 6000 ppm TWA: 200 ppm TWA: 260 mg/m^3 STEL: 325 mg/m^3 STEL: 250 ppm
Ethyl alcohol 64-17-5	TWA: 1000 ppm	TWA: 1000 ppm TWA: 1900 mg/m^3	IDLH: 3300 ppm TWA: 1000 ppm TWA: 1900 mg/m^3
Water 7732-18-5	None Known	None Known	None Known

Personal Protective Equipment

Eye/Face Protection Safety glasses with side-shields.

Skin and Body Protection Wear protective gloves/clothing. Nitrile rubber. Gloves & Lab Coat.

Respiratory Protection Use only with adequate ventilation.

Hygiene Measures Do not eat, drink or smoke when using this product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Dark green	**Odor**	Alcohol
Physical State	Liquid	**pH**	Not applicable
Flash Point	23°C (74°F) CC	**Boiling Point/Range**	78.5°C (173.3°F) for SDA (3A) Ethyl Alcohol

Explosion Limits

Upper 19% Ethanol

Lower 3.3% Ethanol

Vapor Pressure	48 mmHg @ 20 °C for SDA (3A) Ethyl Alcohol	**Vapor Density**	1.6 @ 20°C (Air=1) for SDA (3A) Ethyl Alcohol

10. STABILITY AND REACTIVITY

Stability Stable under normal conditions of use and storage.

Incompatible Products Nitric acid. Strong oxidizing agents.

Conditions to Avoid Heat, flames and sparks.

Hazardous Decomposition Products Carbon oxides (COx).

Hazardous Polymerization Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Methyl red	None Known	None Known	None Known
Phenolphthalein	None Known	None Known	None Known
Bromothymol blue	None Known	None Known	None Known
Thymol blue	None Known	None Known	None Known
Potassium hydroxide	214 mg/kg (Rat)	None Known	85 mg/L Gambusia affinis 24 hr
2,4-Dinitrophenol	30 mg/kg (Rat)	None Known	None Known
Methyl alcohol	5628 mg/kg (Rat)	15800 mg/kg (Rabbit)	64000 ppm (Rat) 4 h 83.2 mg/L (Rat) 4 h
Ethyl alcohol	1501 mg/kg (Rat)	None Known	124.7 mg/L (Rat) 4 h
Water	90 mL/kg (Rat)	None Known	None Known

Chronic Toxicity

Chronic Toxicity Ethanol has been shown to be a reproductive toxin only when consumed as an alcoholic beverage. Prolonged skin contact may cause skin irritation and/or dermatitis.

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Chemical Name	ACGIH	IARC	NTP	OSHA
Methyl red	None Known	None Known	None Known	None Known
Phenolphthalein	None Known	Group 2B	Reasonably Anticipated	X
Bromothymol blue	None Known	None Known	None Known	None Known
Thymol blue	None Known	None Known	None Known	None Known
Potassium hydroxide	None Known	None Known	None Known	None Known
2,4-Dinitrophenol	None Known	None Known	None Known	None Known
Methyl alcohol	None Known	None Known	None Known	None Known
Ethyl alcohol	None Known	None Known	Known	None Known
Water	None Known	None Known	None Known	None Known

Chemical Name	EU - Endocrine Disrupters Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Methyl red	None Known	None Known	None Known
Phenolphthalein	Group III Chemical	None Known	None Known
Bromothymol blue	None Known	None Known	None Known
Thymol blue	None Known	None Known	None Known
Potassium hydroxide	None Known	None Known	None Known
2,4-Dinitrophenol	None Known	None Known	None Known
Methyl alcohol	None Known	None Known	None Known
Ethyl alcohol	None Known	None Known	None Known
Water	None Known	None Known	None Known

12. ECOLOGICAL INFORMATION

Ecotoxicity

Chemical Name	Toxicity to Algae	Toxicity to Fish	Microtox	Daphnia Magna (Water Flea)
Methyl red	None Known	None Known	None Known	None Known
Phenolphthalein	None Known	None Known	None Known	None Known
Bromothymol blue	None Known	None Known	None Known	None Known
Thymol blue	None Known	None Known	None Known	None Known
Potassium hydroxide	None Known	None Known	None Known	None Known
2,4-Dinitrophenol	None Known	LC50= 6.58 mg/L Pimephales promelas 96 h	None Known	None Known
Methyl alcohol	None Known	LC50= 13200 mg/L Oncorhynchus mykiss 96 h LC50= 28100 mg/L Pimephales promelas 96 h	EC50 = 39000 mg/L 25 min EC50 = 40000 mg/L 15 min EC50 = 43000 mg/L 5 min	None Known
Ethyl alcohol	None Known	LC50= 12900 mg/L Oncorhynchus mykiss 96 h LC50= 14.2 mg/L Pimephales promelas 96 h	EC50 = 34634 mg/L 30 min EC50 = 35470 mg/L 5 min	EC50 = 10800 mg/L 24 h EC50 = 9268 mg/L 48 h
Water	None Known	None Known	None Known	None Known

Persistence and Degradability No information available.

Bioaccumulation/Accumulation No information available.

Chemical Name	Log Pow
Methyl red	None Known
Phenolphthalein	None Known
Bromothymol blue	None Known
Thymol blue	None Known
Potassium hydroxide	= 0.65 = 0.83
2,4-Dinitrophenol	= 1.54
Methyl alcohol	= -0.77
Ethyl alcohol	= -0.32
Water	None Known

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method Dispose of in accordance with local regulations.

Chemical Name	RCRA - Halogenated Organic Compounds	RCRA - P Series Wastes	RCRA - F Series Wastes	RCRA - K Series Wastes
Methyl red - 493-52-7	None Known	None Known	None Known	None Known
Phenolphthalein - 77-09-8	None Known	None Known	None Known	None Known
Bromothymol blue - 76-59-5	None Known	None Known	None Known	None Known
Thymol blue - 76-61-9	None Known	None Known	None Known	None Known
Potassium hydroxide - 1310-58-3	None Known	None Known	None Known	None Known
2,4-Dinitrophenol - 51-28-5	None Known	P048	None Known	None Known
Methyl alcohol - 67-56-1	None Known	None Known	None Known	None Known
Ethyl alcohol - 64-17-5	None Known	None Known	None Known	None Known
Water - 7732-18-5	None Known	None Known	None Known	None Known

Chemical Name	California Hazardous Waste Status
Ethyl alcohol	Toxic; Ignitable

14. TRANSPORT INFORMATION

DOT Not regulated

Proper Shipping Name	ETHANOL SOLUTION (Ethyl Alcohol Solution)
Hazard Class	3
UN-No	1170
Packing Group	II

IATA

UN-No	1170
Proper Shipping Name	ETHANOL SOLUTION (Ethyl Alcohol Solution)
Hazard Class	3
Packing Group	II

IMDG/IMO

Proper Shipping Name	ETHANOL SOLUTION (Ethyl Alcohol Solution)
Hazard Class	3
UN-No	1170
Packing Group	II

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Methyl red 493-52-7 (<0.05)	Present	X	X	5-243	X	KE-06693	X	X
Phenolphthalein 77-09-8 (<0.05)	Present	X	X	9-1152	X	KE-03234	X	X
Bromothymol blue 76-59-5 (<0.05)	Present	X	X	ENCS	X	KE-02744	X	X
Thymol blue 76-61-9 (<0.05)	Present	X	X	ENCS	X	KECL	X	X
Potassium hydroxide 1310-58-3 (<0.05)	Present	X	X	1-369	X	KE-29139	X	X
2,4-Dinitrophenol 51-28-5 (0.05)	Present	X	X	3-797	X	KE-11946	X	X
Methyl alcohol 67-56-1 (2)	Present	X	X	2-201	X	KE-23193	X	X
Ethyl alcohol 64-17-5 (52)	Present	X	X	2-202	X	KE-13217	X	X
Water 7732-18-5 (to 100%)	Present	X	X	ENCS	X	KE-35400	X	X

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	CAS-No	Weight %	SARA 313 - Threshold Values %
Methyl red	493-52-7	<0.05	None Known
Phenolphthalein	77-09-8	<0.05	None Known
Bromothymol blue	76-59-5	<0.05	None Known
Thymol blue	76-61-9	<0.05	None Known
Potassium hydroxide	1310-58-3	<0.05	None Known
2,4-Dinitrophenol	51-28-5	0.05	1.0
Methyl alcohol	67-56-1	2	1.0
Ethyl alcohol	64-17-5	52	None Known
Water	7732-18-5	to 100%	None Known

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	Yes
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act
This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Component	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Methyl red 493-52-7 (<0.05)	None Known	None Known	None Known	None Known
Phenolphthalein 77-09-8 (<0.05)	None Known	None Known	None Known	None Known
Bromothymol blue 76-59-5 (<0.05)	None Known	None Known	None Known	None Known

Thymol blue 76-61-9 (<0.05)	None Known	None Known	None Known	None Known
Potassium hydroxide 1310-58-3 (<0.05)	1000 lb	None Known	None Known	X
2,4-Dinitrophenol 51-28-5 (0.05)	None Known	X	X	X
Methyl alcohol 67-56-1 (2)	None Known	None Known	None Known	None Known
Ethyl alcohol 64-17-5 (52)	None Known	None Known	None Known	None Known
Water 7732-18-5 (to 100%)	None Known	None Known	None Known	None Known

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)
This product contains the following HAPs: .

Chemical Name	CAS-No	Weight %	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methyl red	493-52-7	<0.05	None Known	None Known	None Known	None Known
Phenolphthalein	77-09-8	<0.05	None Known	Group III	None Known	None Known
Bromothymol blue	76-59-5	<0.05	None Known	None Known	None Known	None Known
Thymol blue	76-61-9	<0.05	None Known	None Known	None Known	None Known
Potassium hydroxide	1310-58-3	<0.05	None Known	None Known	None Known	None Known
2,4-Dinitrophenol	51-28-5	0.05	Present	Group III	None Known	None Known
Methyl alcohol	67-56-1	2	Present	Group IV	None Known	None Known
Ethyl alcohol	64-17-5	52	None Known	None Known	None Known	None Known
Water	7732-18-5	to 100%	None Known	None Known	None Known	None Known

CERCLA

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs
Methyl red	None Known	None Known
Phenolphthalein	None Known	None Known
Bromothymol blue	None Known	None Known
Thymol blue	None Known	None Known
Potassium hydroxide	1000 lb	None Known
2,4-Dinitrophenol	10 lb	None Known
Methyl alcohol	5000 lb	None Known
Ethyl alcohol	None Known	None Known
Water	None Known	None Known

U.S. State Regulations

California Proposition 65
WARNING! This product contains a chemcial know to the State of California to cause birth defects or other reproductive harm
WARNING! This product contains a chemcial know to the State of California to cause cancer

Chemical Name	CAS-No	California Prop. 65
Methyl red	493-52-7	None Known
Phenolphthalein	77-09-8	Carcinogen
Bromothymol blue	76-59-5	None Known
Thymol blue	76-61-9	None Known
Potassium hydroxide	1310-58-3	None Known
2,4-Dinitrophenol	51-28-5	None Known
Methyl alcohol	67-56-1	None Known
Ethyl alcohol	64-17-5	Developmental
Water	7732-18-5	None Known

U.S. State Right-to-Know Regulations

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methyl red	None Known	None Known	None Known	None Known	None Known
Phenolphthalein	None Known	None Known	None Known	None Known	None Known
Bromothymol blue	None Known	None Known	None Known	None Known	None Known
Thymol blue	None Known	None Known	None Known	None Known	None Known
Potassium hydroxide	X	X	X	None Known	X
2,4-Dinitrophenol	X	X	X	X	None Known
Methyl alcohol	X	X	X	X	X
Ethyl alcohol	X	X	X	None Known	X
Water	None Known	None Known	None Known	None Known	None Known

International Regulations

Mexico - Grade

Chemical Name	Carcinogen Status	Exposure Limits
Methyl red	None Known	None Known
Phenolphthalein	None Known	None Known
Bromothymol blue	None Known	None Known
Thymol blue	None Known	None Known
Potassium hydroxide	None Known	None Known
2,4-Dinitrophenol	None Known	None Known
Methyl alcohol	None Known	Mexico: TWA= 200 ppm Mexico: TWA= 260 mg/m³
Ethyl alcohol	None Known	Mexico: TWA= 1000 ppm Mexico: TWA= 1900 mg/m³
Water	None Known	None Known

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

Component	WHMIS Hazard Class
Methyl red 493-52-7 (<0.05)	Uncontrolled product according to WHMIS classification criteria
Phenolphthalein 77-09-8 (<0.05)	Not determined
Bromothymol blue 76-59-5 (<0.05)	Uncontrolled product according to WHMIS classification criteria
Thymol blue 76-61-9 (<0.05)	Not determined
Potassium hydroxide 1310-58-3 (<0.05)	1 % D1B E
2,4-Dinitrophenol 51-28-5 (0.05)	0.1 %
Methyl alcohol 67-56-1 (2)	1 % B2 D1B D2A D2B
Ethyl alcohol 64-17-5 (52)	0.1 % B2 D2B
Water 7732-18-5 (to 100%)	Uncontrolled product according to WHMIS classification criteria

Chemical Name	NPRI
Methyl alcohol	X

Legend
X - Listed

16. OTHER INFORMATION

NFPA	HMIS	PPE	Transport Symbol

Prepared By Regulatory Affairs Department

Issuing Date 9/9/2011

Revision Date 09-Sep-2011

Revision Note
Initial Release

Disclaimer
The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS