



A Case of Unintentional Overdose

Teacher Information

..... just add students™

Summary

Students follow the case of a teen with symptoms of liver damage. They conduct simulated laboratory tests and analyze the medicines the teen took to determine that his symptoms are caused by a dangerous acetaminophen overdose.

Core Concepts

- Acetaminophen is a pain medicine found in many over-the-counter medications and some prescription medications.
- Acetaminophen overdose can cause liver damage.
- Liver damage can lead to serious illness or death because the liver carries out many functions critical for maintaining homeostasis.
- Acetaminophen overdose can result from taking too much of one medicine.
- Acetaminophen overdose can result from taking two or more medicines that contain acetaminophen.

Time Required

2–3 forty-minute class periods.

Kit Contains

- 3 simulated medicine labels
- **Laboratory Test Sheet**
- **Color Charts for Laboratory Tests**
- Luis Cordera Blood Plasma (simulated)
- Bilirubin Test Solution (simulated)
- Albumin Test Solution (simulated)
- ALT Enzyme Test Paper (simulated)
- Labeled droppers for plasma and test solutions

Teacher Provides

- Safety goggles
- Paper towels for clean-up

Warning: Choking Hazard

This Science Take-Out kit contains small parts. Do not allow children under the age of seven to have access to any kit components.

Teacher Resources

- **Your Guide to Over-the-Counter Pain Relief** slideshow discusses what to consider when taking OTC pain relievers.
<http://www.webmd.com/drug-medication/otc-pain-relief-10/slideshow-pain-relievers>
- **KnowYourDose.org** from the Acetaminophen Awareness Coalition provides a variety of resources including a report and an infographic on acetaminophen use.
<http://www.knowyourdose.org/>
- **Acetaminophen-Savvy resource guide: tools for teen influencers** provides resources for teachers on the safe use of acetaminophen.
<http://www.talkaboutrx.org/acetaminophen/teen-influencers-landing.jsp>
- **Taking Acetaminophen Safely** is a video (approximately 2 minutes) from the US Food and Drug Administration. <https://www.youtube.com/watch?v=cBDOx85Ywck>
- **Ten Tips to Prevent an Accidental Overdose** provides information on the importance of using the appropriate dosing devices when taking liquid medicine.
<http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm253338.htm>

Reusing the Kit

Teachers will need to instruct students on how to handle clean-up and return of the reusable kit materials. For example, teachers might provide the following information for students:

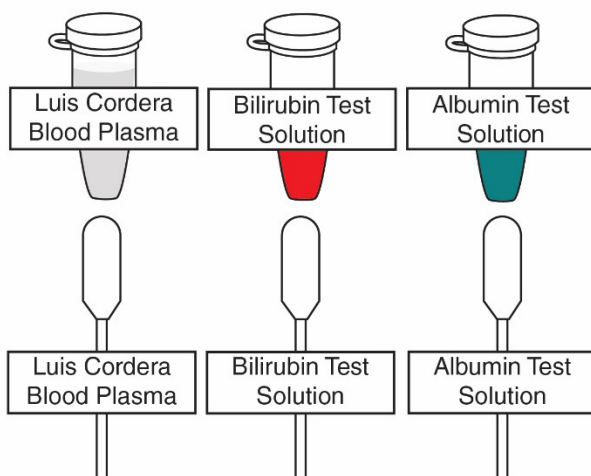
Discard	Return to kit bag
• Used test paper • Used laboratory test sheets	• All tubes • All droppers* • Medicine labels • Color Charts for Laboratory Tests • All tubes • All droppers • Bag for test paper <i>Consider laminating the medicine labels if the kit will be reused.</i>

* **Note:** It is not necessary to rinse or wash the droppers after use. Because the droppers are labeled, there is little chance for contamination. Washing the droppers may make the labels difficult to read. Simply ask students to squirt out any extra liquid from the droppers.

Refills for **A Case of Unintentional Overdose** kits are available at www.sciencetakeout.com. The **10 Kit Refill Pack** includes the following materials:

- Instructions and Quick Guide for refilling kit
- Graduated droppers for refilling tubes
- 10 mL of Luis Cordero Blood Plasma
- 5 mL of Bilirubin Test Solution
- 5 mL of Albumin Test Solution
- **10 Laboratory Test Sheets**
- 20 strips of ALT Enzyme Test Paper

Kit Contents Quick Guide



Laboratory Test Sheet	
Laboratory Tests	Add 2 drops of Luis Cordera Blood Plasma to each circle.
Plasma Bilirubin Test	Add 1 drop of Bilirubin Test Solution to this circle.
Plasma Albumin Test	Add 1 drop of Albumin Test Solution to this circle.
ALT Enzyme Test	Add one strip of ALT Test Paper to this circle.

Color Charts for Laboratory Tests

Plasma Bilirubin Test		
Low	Normal	High
Plasma Albumin Test		
Low	Normal	High
ALT Enzyme Test		
Low	Normal	High

Read these instructions before using Science Take-Out kits

Parental or Adult Supervision Required

This kit should be used only under the supervision of an adult who is committed to ensuring that the safety precautions below, and in the specific laboratory activity, are followed.

Safety Goggles and Gloves Strongly Recommended

We encourage students to adopt safe lab practices, and wear safety goggles and gloves when performing laboratory activities involving chemicals. Safety goggles and gloves are not provided in Science Take-Out kits. They may be purchased from a local hardware store or pharmacy.

Warning: Choking and Chemical Hazard

Science Take-Out kits contain small parts that could pose a choking hazard and chemicals that could be hazardous if ingested. Do not allow children under the age of seven to have access to any kit components. Safety Data Sheets (SDS) provide specific safety information regarding the chemical contents of the kits. SDS information for each kit is provided in the accompanying teacher instructions.

Chemicals Used in Science Take-Out Kits

Every effort has been made to reduce the use of hazardous chemicals in Science Take-Out kits. Most kits contain common household chemicals or chemicals that pose little or no risk.

General Safety Precautions

1. Work in a clean, uncluttered area. Cover the work area to protect the work surface.
2. Read and follow all instructions carefully.
3. Pay particular attention to following the specific safety precautions included in the kit activity instructions.
4. Goggles and gloves should be worn while performing experiments using chemicals.
5. Do not use the contents of this kit for any other purpose beyond those described in the kit instructions.
6. Do not leave experiment parts or kits where they could be used inappropriately by others.
7. Never taste or ingest any chemicals provided in the kit – they may be toxic.
8. Do not eat, drink, or apply make-up or contact lenses while performing experiments.
9. Wash your hands before and after performing experiments.
10. Chemicals used in Science Take-Out experiments may stain or damage skin, clothing or work surfaces. If spills occur, wash the area immediately and thoroughly.
11. At the end of the experiment, return ALL kit components to the kit plastic bag. Dispose of the plastic bag and contents in your regular household trash

No blood or body fluids from humans or animals are used in Science Take-Out kits. Chemical mixtures are substituted as simulations of these substances.

A Case of Unintentional Overdose - *Teacher Answer Key*

The Case

Two days ago, fourteen year-old Luis Cordera felt like he was coming down with the flu and had trouble sleeping. He took some over-the-counter (OTC) medicines for his headache, cold symptoms, and insomnia (difficulty sleeping). Over-the-counter medicines are legal drugs that can be purchased without a prescription from a doctor. They can be purchased at pharmacies, grocery stores, or convenience stores.

Today at school, Luis began feeling nauseous and started vomiting. His stomach hurt, he was sweating excessively, and his heart felt like it was racing. Luis's science teacher noticed that the whites of his eyes and his skin were yellowish, and he insisted that Luis go to the school nurse. The nurse called Luis's parents and told them he should be taken immediately to the emergency room at a nearby hospital.

Part 1: Complete a Patient Record for Luis Cordera

1. Use **The Case** information above to complete a patient record for Luis Cordera. List at least 5 symptoms that Luis is experiencing at school.

General Hospital - Patient Record	
Date of Admission: 2/12/2017	Time of Admission: 2:50 pm
Patient Name: Luis Cordera	Gender: Male Age: 14 years
Height: 65 inches (165 cm)	Weight: 115 pounds (52.2 kilograms)
Temperature: 99 °F (37 °C)	Heart Rate: 100 beats per minute
Symptoms:	

2. Do you think that Luis has the “stomach flu” or some other health problem? Support your answer with evidence from the patient record.

Part 2: Laboratory Tests for Luis Cordera

The emergency room doctor noticed that Luis had a medical condition called jaundice. Jaundice results when too much bilirubin (pronounced *BIL-ee-roo-bin*), a yellow pigment, accumulates in the body. This causes the skin and the whites of the eyes to turn yellow. Bilirubin is processed by the liver so that it can be eliminated from the body.

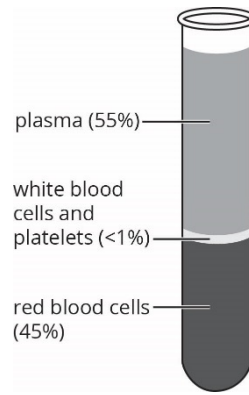
Jaundice can happen for many reasons, such as blood diseases, liver diseases, digestive diseases, infections, and medicines. The doctor ordered laboratory tests on Luis's blood to help determine what was causing Luis's jaundice.

1. What is the name of the yellow pigment that builds up in the blood when a person has jaundice?
2. List at least four things that can cause jaundice.
3. Why might the doctor want to conduct laboratory tests on Luis Cordera's blood?

Follow the instructions on pages 3 and 4 to conduct each of the three laboratory tests that the doctor ordered. Record the results of the laboratory tests on the **Data Table: Laboratory Test Results** sheet on the last page of this handout. *Note: You may tear the Data Table page off to make it easier for you to record the results.*

Blood Plasma

Plasma is a pale yellow liquid that makes up 55% of the blood. It is composed of water with dissolved salts, proteins, and enzymes. The primary purpose of plasma is to transport nutrients, hormones, and proteins to the parts of the body that need them. Cells also deposit their waste products into the plasma, and the plasma in turn helps remove this waste from the body.



Plasma Bilirubin Test

- Place two drops of Luis Cordera's blood plasma sample onto the circle labeled "Plasma Bilirubin Test" on the **Laboratory Test Sheet**.
- Add 1 drop of Bilirubin Test Solution to the plasma in the circle.
- Use the **Plasma Bilirubin Test** color chart to determine the level of bilirubin in the plasma sample.
- Record the results of the bilirubin test on the **Data Table: Laboratory Test Results** sheet.
- What does the result of the plasma bilirubin test indicate about Luis Cordera's health? Record the answer to this question in the last column of the **Data Table: Laboratory Test Results** sheet.

Bilirubin testing checks for levels of bilirubin in blood plasma. Bilirubin, a yellow pigment, is a waste product of the normal breakdown of red blood cells. Higher than normal levels of bilirubin may indicate different types of liver problems. Occasionally, higher bilirubin levels may indicate an increased rate of red blood cell breakdown.

Plasma Albumin Test

- Place two drops of Luis Cordera's blood plasma sample onto the circle labeled "Plasma Albumin Test" on the **Laboratory Test Sheet**.
- Add 1 drop of Albumin Test Solution to the plasma in the circle.
- Use the **Plasma Albumin Test** color chart to determine the albumin level.
- Record the results of the albumin test on the **Data Table: Laboratory Test Results** sheet.

Albumin is a plasma protein made by the liver. Albumin is a protein needed to keep the correct amount of water in the blood and body tissues. Albumin testing measures the amount of this protein in the plasma. Low levels of plasma albumin may be a sign of kidney disease or liver disease. High levels of plasma albumin may be a sign of dehydration or a high protein diet.

13. What does the result of the plasma albumin test indicate about Luis Cordera's health?
Record the answer to this question in the last column of the **Data Table: Laboratory Test Results** sheet.

ALT Enzyme Test

14. Place two drops of Luis Cordera's blood plasma sample onto the circle labeled "**ALT Enzyme Test**" on the **Laboratory Test Sheet**.
15. Add 1 strip of ALT Enzyme Test Paper to the plasma in the circle.
16. Use the **ALT Enzyme Test** color chart to determine the ALT enzyme level.

The ALT enzyme test measures the level of ALT enzyme in blood plasma. ALT is an enzyme that helps the liver break down proteins that can be used as a source of energy. ALT is normally found inside liver cells. If liver cells are damaged, they may release ALT enzyme into blood plasma. Therefore, ALT enzyme in blood plasma indicates liver damage.

17. Record the results of the ALT enzyme test on **Data Table: Laboratory Test Results** sheet.
18. What does the result of the ALT enzyme test indicate about Luis Cordera's health? Record the answer to this question in the last column of the **Data Table: Laboratory Test Results** sheet.

Conclusions

19. Based on all of the test results, what can you conclude is causing Luis Cordera's jaundice? Support your conclusions with at least three pieces of evidence from the **Data Table: Laboratory Test Results** sheet.
20. Which of the three tests provides the best evidence that Luis has liver damage? Support your answer with information provided from the test.

Part 3: What Caused Luis Cordera's Liver Damage?

The doctor explained that knowing what caused Luis's liver damage would help him select the best treatment for Luis. The doctor asked Luis and his parents whether Luis had used alcohol, prescription medicines, over-the-counter medicines or illegal drugs during the last few days. Luis explained that he had only used over-the-counter medicines that were in his family's medicine cabinet. All he had taken in the last few days were medicines for his headache, fever, flu symptoms, and some medicine to help him sleep. Luis also explained that he had been careful to read the directions and take only the dose that the label indicated.

Extra Strength Pain Reliever

Luis said that he took two **Extra Strength Pain Reliever** caplets when he woke up, two caplets at lunch time, two caplets at dinner time, and two caplets at bedtime.

1. Look at the **Extra Strength Pain Reliever** label. How many mg (milligrams) of acetaminophen were in all of the **Extra Strength Pain Reliever** caplets that Luis took? _____

Show your calculations in the space below.

2. Did Luis follow the dosage instructions on the **Extra Strength Pain Reliever** label? _____

Support your answer with information from the label.

Adult Cold and Flu Formula

Luis said he took two **Adult Cold and Flu Formula** capsules when he woke up, two capsules at lunch time, two capsules at dinner time, and two capsules at bedtime.

3. Look at the **Adult Cold and Flu Formula** label. How many mg (milligrams) of acetaminophen were in all of the **Adult Cold and Flu Formula** capsules that Luis took? _____

Show your calculations in the space below.

4. Did Luis follow the dosage instructions on the **Adult Cold and Flu Formula** label? _____

Support your answer with information from the label.

Nighttime Relief

Luis said he had been having trouble getting to sleep so he took 2 tablespoons (30 mL) of **Nighttime Relief** at 10:00 pm. When he was still awake at 11:00 pm, he took another 2 tablespoons.

5. Look at the **Nighttime Relief** label. How many mg (milligrams) of acetaminophen were in all of the **Nighttime Relief** liquid that Luis took? _____ milligrams

Show your calculations in the space below.

6. Did Luis follow the instructions on the **Nighttime Relief** label? _____

Support your answer with information from the label.

The doctor explained that many people don't realize that acetaminophen is found in many over-the-counter medicines, including pain relievers, fever reducers, and cough and cold medicines. While acetaminophen is safe and effective when used as directed, there is a limit to how much you should take in one day. Adults weighing over 50 kg (110 pounds) can take a maximum dose of 4,000 milligrams per day. Taking more acetaminophen than directed is an overdose that can lead to liver damage.

7. Luis weighs 115 pounds. Did Luis take an overdose of acetaminophen? _____

Support your answer by calculating the total amount of acetaminophen Luis took. Show your work in the space below.

- **Extra Strength Pain Reliever**
- **Adult Cold and Flu Formula**
- **Nighttime Relief**
- **TOTAL =**

Some people do not realize that prescription medicines may also contain acetaminophen. Before taking over-the-counter pain medicines, it is important to read prescription labels or ask a doctor or a pharmacist to be sure the prescription medicine you are taking does not contain acetaminophen. On prescription medicine labels, acetaminophen is often listed as APAP.

8. Would it be safe for Luis to take two **Adult Cold and Flu Formula** capsules and two tablets of the prescription medicine shown on the right every 6 hours? Explain why or why not.

Town Pharmacy
1 Main Street, Townsville, NY 12345
Phone: 555-123-4567

Dr. Haus
Rx # 18475030

LUIS CORDERA
8 East Avenue, Townsville, NY 12345

TAKE 1-2 TABLETS BY MOUTH
EVERY 4 TO 6 HOURS AS
NEEDED FOR PAIN

Hydrocodone 5 MG /
APAP 325 MG

Qty: 30
Refill: Doctor authorization required

APAP = acetaminophen

9. A new report from the Acetaminophen Awareness Coalition highlights common mistakes that patients often make when using acetaminophen:

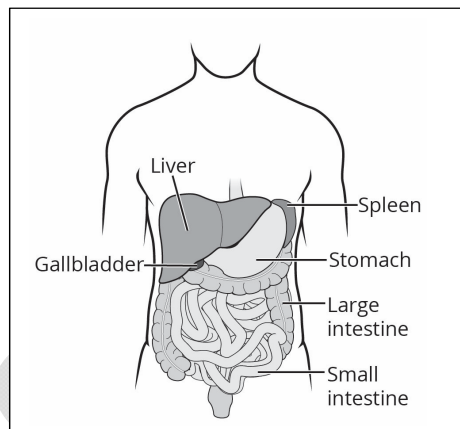
- **Taking more than the recommended dose for any of the medicines at a single time.**
Did Luis do this for any of the medicines? Support your answer with specific information.
- **Taking the next dose too soon.**
Did Luis do this? Support your answer with specific information.
- **Using multiple products with acetaminophen at the same time.**
Did Luis do this? Support your answer with specific information.

Part 4: Why is a Healthy Liver Important?

The doctor told Luis's parents that Luis's condition was extremely serious. The results of Luis's laboratory tests indicated that his liver was severely damaged. The doctor explained that when the liver stops functioning, it is a medical emergency that requires immediate treatment.

The liver is a large reddish brown organ that sits on the right side of the belly. A healthy liver is essential for maintaining homeostasis because it:

- Removes excess sugar and amino acids from the blood.
- Releases sugar into the blood when blood sugar levels are low.
- Removes waste products such as bilirubin, ammonia, and other toxins from the blood.
- Absorbs and stores fat, sugars, vitamins, iron, and other minerals.
- Produces cholesterol that is important for cell membrane structure.
- Produces important proteins such as albumin and blood clotting enzymes.
- Breaks down (metabolizes) alcohol and many drugs.



Homeostasis is a healthy state that is maintained by the constant adjustment of biochemical and physiological processes needed to keep the body stable enough to function properly. Failure to maintain homeostasis may result in illness or death.

1. List at least five ways in which liver damage resulted in a lack of homeostasis for Luis.
2. Do you think that Luis can survive if his liver does not begin functioning again? Explain why or why not.

A person who took an overdose of acetaminophen usually shows no symptoms until two days after the overdose. By then it may be too late for medical treatment to be effective, and liver damage could lead to death. Luis is very lucky because he received medical treatment within one day of his acetaminophen overdose.

Luis is responding well to treatment with Acetadote, a medicine used to treat acetaminophen overdoses. Luis has been in the hospital's intensive care unit for four days. Recent tests indicate that Luis's liver function is gradually returning to normal. He is expected to return home in a week or two.

3. Some products have safety warning labels to be certain that people understand the risks of using these products. On a separate sheet of paper, design an acetaminophen warning label that could be used on any medicine that contains acetaminophen. This label should:
 - Be easily understood by someone with limited ability to read English.
 - Make people aware that serious liver damage may result from an acetaminophen overdose.

For more information on acetaminophen overdose see:

MedlinePlus: Acetaminophen Overdose

<https://www.nlm.nih.gov/medlineplus/ency/article/002598.htm>

Data Table: Laboratory Test Results

Laboratory Tests	Results (low, normal, or high)	Interpretation of Results: What do the results indicate about Luis Cordera's liver function? <i>Hint: Refer to the information about each test under the test title.</i>
Plasma Bilirubin Test		
Plasma Albumin Test		
ALT Enzyme Test		

Section 1 Chemical Product and Company Information

Science Take-Out
80 Office Park Way
Pittsford, NY 14534
(585)764-5400

CHEMTREC 24 Hour Emergency
Phone Number (800) 424-9300
For laboratory use only. Not for drug, food or household use

Product	Buffer Solution pH10
Synonyms	"Luis Cordera Blood Plasma" (simulated)

Section 2 Hazards Identification

This substance or mixture has not been classified at this time according to the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals.

Signal word: WARNING
Pictograms: None required
Target organs: None known

GHS Classification:
Skin irritation (Category 3)
Eye irritation (Category 2B)

GHS Label information: Hazard statement(s):
H316: Causes mild skin irritation.
H320: Causes eye irritation.

Precautionary statement(s):

P264: Wash hands thoroughly after handling.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P332+P313: If skin irritation occurs: Get medical attention.

P337+P313: If eye irritation persists: Get medical attention.

Ca Prop 65 - This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive harm.

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	EINECS
Water	7732-18-5	99.08%	231-791-2
Potassium chloride	7447-40-7	0.40%	231-211-8
Boric acid	10043-35-3	0.33%	233-139-2
Sodium hydroxide	1310-73-2	0.19%	215-185-5

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN ABSORPTION: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

Suitable Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Protective Actions for Fire-fighters: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool.

Specific Hazards: During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Section 6 Accidental Release Measures

Personal Precautions: Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation.

Environmental Precautions: Avoid runoff into storm sewers and ditches which lead to waterways.

Containment and Cleanup: Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water.

Section 7 Handling and Storage

Precautions for Safe Handling: Read label on container before using. Do not wear contact lenses when working with chemicals. Keep out of reach of children. Avoid contact with eyes, skin and clothing. Do not inhale vapors, spray or mist. Use with adequate ventilation. Avoid ingestion. Wash thoroughly after handling. Remove and wash clothing before reuse.

Conditions for Safe Storage: Store in a cool, well-ventilated area away from incompatible substances.

Section 8 Exposure controls / Personal Protection

Exposure Limits:	Chemical Name	ACGIH (TLV)	OSHA (PEL)	NIOSH (REL)
	Potassium chloride	None established	None established	None established

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If misty conditions prevail, work in fume hood or wear a NIOSH/MSHA approved respirator.

Section 9 Physical and Chemical Properties

Appearance: Clear, colorless liquid. Odor: No odor. Odor threshold: Data not available. pH: 10.0 Melting/Freezing point: Approx. 0°C (32°F) (water) Boiling point: Approx. 100°C (212°F) (water) Flash point: Data not available	Evaporation rate (Water = 1): <1 Flammability (solid/gas): Data not available. Explosion limits: Lower/Upper: Data not available Vapor pressure (mm Hg): 14 (water) Vapor density (Air = 1): 0.7 (water) Relative density (Specific gravity): Approx. 1.0 (water) Solubility(ies): Complete in water.	Partition coefficient: Data not available Auto-ignition temp.: Data not available Decomposition temp.: Data not available Viscosity: Data not available. Molecular formula: Mixture Molecular weight: Mixture
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Section 10 Stability and Reactivity

Chemical stability: Stable **Hazardous polymerization:** Will not occur.

Conditions to avoid: Excessive temperatures which cause evaporation.

Incompatibilities with other materials: Acids, alkalis, and air will change the buffer's ability.

Hazardous decomposition products: Boron oxide and chlorine gas.

Section 11 Toxicological Information

Acute toxicity: Data not available Serious eye damage/irritation: Data not available Germ cell mutagenicity: Data not available	Skin corrosion/irritation: Data not available Respiratory or skin sensitization: Data not available Carcinogenicity: Data not available
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NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity: Data not available Aspiration hazard: Data not available	STOT-single exposure: Data not available STOT-repeated exposure: Data not available
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Potential health effects:

- Inhalation: May be harmful if inhaled.
- Ingestion: May be harmful if swallowed.
- Skin: May cause mild irritation.
- Eyes: May cause mild irritation.

Signs and symptoms of exposure: To the best of our knowledge the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

Additional information: RTECS #: Data not available

Section 12 Ecological Information

Toxicity to fish: No data available Toxicity to daphnia and other aquatic invertebrates: No data available Toxicity to algae: No data available Persistence and degradability: No data available Mobility in soil: No data available	Bioaccumulative potential: No data available PBT and vPvB assessment: No data available
Other adverse effects: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.	

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: Not applicable Hazard class: Not applicable Exceptions: Not applicable	Shipping name: Not Regulated Packing group: Not applicable 2012 ERG Guide # Not applicable	Reportable Quantity: No	Marine pollutant: No
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Section 15 Regulatory Information

A chemical is considered to be listed if the CAS number for the anhydrous form is on the Inventory list.

Component	TSCA	CERLCA (RQ)	RCRA code	DSL	NDSL	WHMIS Classification
Potassium Chloride	Listed	Not Listed	Not Listed	Listed	Not Listed	Uncontrolled Product
Sodium hydroxide	Listed	1,000 lbs (454 kg)	D002	Listed	Not Listed	E

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees.

NTP: National Toxicology Program, IARC: International Agency for Research on Cancer, OSHA: Occupational Safety and Health Administration, STOT: Specific Target Organ Toxicity, SE: Single Exposure, RE: Repeated Exposure, ERG: Emergency Response Guidebook.

Revision Date: July 18, 2018 Supersedes:

Section 1 Chemical Product and Company Information

Science Take-Out
80 Office Park Way
Pittsford, NY 14534
(585)764-5400

CHEMTREC 24 Hour Emergency
Phone Number (800) 424-9300
For laboratory use only. Not for drug, food or household use

Product	Methyl red, 0.1% aqueous solution
Synonyms	"Bilirubin Test Solution" (simulated)

Section 2 Hazards Identification

This substance or mixture has not been classified at this time according to the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals.

Signal word: Not classified
Pictograms: Not classified
Target organs: None known

GHS Classification: Not classified
GHS Label information: Not classified
Precautionary Statement: Not classified

Supplementary information:

Do not breathe vapors, spray or mist. Do not get in eyes, on skin, or on clothing. Wear protective gloves/protective clothing/eye protection/face protection. Wash hands thoroughly after handling. Get medical attention if you feel unwell.

Ca Prop 65 - This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive harm.

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	EINECS
Water	7732-18-5	99.9%	231-791-2
Methyl red, sodium salt	845-10-3	0.1%	212-682-9

Section 4 First Aid Measures

INGESTION: MAY BE HARMFUL IF SWALLOWED. Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: MAY BE HARMFUL IF INHALED. MAY CAUSE RESPIRATORY TRACT IRRITATION. Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: MAY CAUSE EYE IRRITATION. Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN ABSORPTION: MAY CAUSE SKIN IRRITATION. Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

Suitable Extinguishing Media: Carbon dioxide, dry chemical, dry sand, alcohol foam.

Protective Actions for Fire-fighters: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool.

Specific Hazards: In fire conditions, water may evaporate from this solution which may cause hazardous decomposition products to be formed as dust or fume.

Section 6 Accidental Release Measures

Personal Precautions: Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation.

Environmental Precautions: Avoid runoff into storm sewers and ditches which lead to waterways.

Containment and Cleanup: Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water.

Section 7 Handling and Storage

Precautions for Safe Handling: Read label on container before using. Do not wear contact lenses when working with chemicals. Keep out of reach of children. Avoid contact with eyes, skin and clothing. Do not inhale vapors, spray or mist. Use with adequate ventilation. Avoid ingestion. Wash thoroughly after handling. Remove and wash clothing before reuse.

Conditions for Safe Storage: Store in a cool, well-ventilated area away from incompatible substances. Protect from light.

Section 8 Exposure controls / Personal Protection

Exposure Limits:	Chemical Name	ACGIH (TLV)	OSHA (PEL)	NIOSH (REL)
	Methyl red	None established	None established	None established

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If misty conditions prevail, work in fume hood or wear a NIOSH/MSHA approved respirator.

Section 9 Physical and Chemical Properties

Appearance: Liquid, clear, red. Odor: No odor. Odor threshold: Data not available. pH: Data not available Melting/Freezing point: Approx. 0°C (32°F) (water) Boiling point: Approx. 100°C (212°F) (water) Flash point: Data not available	Evaporation rate (Water = 1): <1 Flammability (solid/gas): Data not available. Explosion limits: Lower/Upper: Data not available Vapor pressure (mm Hg): 14 (water) Vapor density (Air = 1): 0.7 (water) Relative density (Specific gravity): Approx. 1.0 (water) Solubility(ies): Complete in water.	Partition coefficient: Data not available Auto-ignition temp.: Data not available Decomposition temp.: Data not available Viscosity: Data not available. Molecular formula: Mixture Molecular weight: Mixture
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Section 10 Stability and Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures which cause evaporation. Protect from light.

Incompatibilities with other materials: Strong oxidizers, reducing agents.

Hazardous decomposition products: Carbon oxides, nitrogen oxides and sodium oxides.

Section 11 Toxicological Information

Acute toxicity: Oral-rat TDLs: 12000 mg/kg [Methyl red]

Serious eye damage/irritation: Data not available

Germ cell mutagenicity: Data not available

Skin corrosion/irritation: Data not available

Respiratory or skin sensitization: Data not available

Carcinogenicity: Data not available

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity: Data not available

STOT-single exposure: Data not available

Aspiration hazard: Data not available

STOT-repeated exposure: Data not available

Potential health effects:

Inhalation: May be harmful if inhaled.

Ingestion: May be harmful if swallowed.

Skin: May cause irritation.

Eyes: May cause irritation.

Signs and symptoms of exposure: To the best of our knowledge the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

Additional information: RTECS #: DG8960000 [Methyl red]

Section 12 Ecological Information

Toxicity to fish: No data available

Toxicity to daphnia and other aquatic invertebrates: No data available

Toxicity to algae: No data available

Persistence and degradability: No data available

Bioaccumulative potential: No data available

Mobility in soil: No data available

PBT and vPvB assessment: No data available

Other adverse effects: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: Not applicable

Shipping name: Not Regulated

Hazard class: Not applicable

Packing group: Not applicable

Reportable Quantity: No

Marine pollutant: No

Exceptions: Not applicable

2012 ERG Guide # Not applicable

Section 15 Regulatory Information

A chemical is considered to be listed if the CAS number for the anhydrous form is on the Inventory list.

Component	TSCA	CERLCA (RQ)	RCRA code	DSL	NDSL	WHMIS Classification
Methyl red, sodium salt	Listed	Not Listed	Not Listed	Listed	Not Listed	Not Listed

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees.

NTP: National Toxicology Program, IARC: International Agency for Research on Cancer, OSHA: Occupational Safety and Health Administration, STOT: Specific Target Organ Toxicity, SE: Single Exposure, RE: Repeated Exposure, ERG: Emergency Response Guidebook.

Revision Date: July 18, 2018 Supersedes:

SAFETY DATA SHEET

GENERAL STORAGE CODE GREEN

Section 1 Chemical Product and Company Information

Science Take-Out
80 Office Park Way
Pittsford, NY 14534
(585)764-5400

CHEMTREC 24 Hour Emergency
Phone Number (800) 424-9300
For laboratory use only. Not for drug, food or household use

Product	Bromothymol blue, 0.1% aqueous solution
Synonyms	"Albumin Test Solution" (simulated)

Section 2 Hazards Identification

This substance or mixture has not been classified at this time according to the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals.

Signal word: Not classified
Pictograms: Not classified
Target organs: None known

GHS Classification: Not classified
GHS Label information: Not classified
Precautionary Statement: Not classified

Supplementary information:

Do not breathe vapors, spray or mist. Do not get in eyes, on skin, or on clothing. Wear protective gloves/protective clothing/eye protection/face protection. Wash hands thoroughly after handling. Get medical attention if you feel unwell.

Ca Prop 65 - This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive harm.

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	EINECS
Water	7732-18-5	99.9%	231-791-2
Bromothymol blue, sodium salt	34722-90-2	0.1%	252-169-7

Section 4 First Aid Measures

INGESTION: MAY BE HARMFUL IF SWALLOWED. Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: MAY BE HARMFUL IF INHALED. MAY CAUSE RESPIRATORY TRACT IRRITATION. Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: MAY CAUSE EYE IRRITATION. Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN ABSORPTION: MAY CAUSE SKIN IRRITATION. Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

Suitable Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Protective Actions for Fire-fighters: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool.

Specific Hazards: In fire conditions, water may evaporate from this solution which may cause hazardous decomposition products to be formed as dust or fume.

Section 6 Accidental Release Measures

Personal Precautions: Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation.

Environmental Precautions: Avoid runoff into storm sewers and ditches which lead to waterways.

Containment and Cleanup: Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water.

Section 7 Handling and Storage

Precautions for Safe Handling: Read label on container before using. Do not wear contact lenses when working with chemicals. Keep out of reach of children. Avoid contact with eyes, skin and clothing. Do not inhale vapors, spray or mist. Use with adequate ventilation. Avoid ingestion. Wash thoroughly after handling. Remove and wash clothing before reuse.

Conditions for Safe Storage: Store in a cool, well-ventilated area away from incompatible substances. Protect from light.

Section 8 Exposure controls / Personal Protection

Exposure Limits:	Chemical Name	ACGIH (TLV)	OSHA (PEL)	NIOSH (REL)
	Bromothymol blue	None established	None established	None established

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If misty conditions prevail, work in fume hood or wear a NIOSH/MSHA approved respirator.

Section 9 Physical and Chemical Properties

Appearance: Liquid, clear, blue-green. Odor: No odor. Odor threshold: Data not available. pH: Data not available Melting/Freezing point: Approx. 0°C (32°F) (water) Boiling point: Approx. 100°C (212°F) (water) Flash point: Data not available	Evaporation rate (Water = 1): <1 Flammability (solid/gas): Data not available. Explosion limits: Lower/Upper: Data not available Vapor pressure (mm Hg): 14 (water) Vapor density (Air = 1): 0.7 (water) Relative density (Specific gravity): Approx. 1.0 (water) Solubility(ies): Complete in water.	Partition coefficient: Data not available Auto-ignition temp.: Data not available Decomposition temp.: Data not available Viscosity: Data not available. Molecular formula: Mixture Molecular weight: Mixture
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Section 10 Stability and Reactivity

Chemical stability: Stable

Hazardous polymerization: Will not occur.

Conditions to avoid: Excessive temperatures which cause evaporation. Protect from light.

Incompatibilities with other materials: Strong oxidizers.

Hazardous decomposition products: Carbon oxides, sulfur oxides and bromine gas.

Section 11 Toxicological Information

Acute toxicity: Data not available

Serious eye damage/irritation: Data not available

Germ cell mutagenicity: Data not available

Skin corrosion/irritation: Data not available

Respiratory or skin sensitization: Data not available

Carcinogenicity: Data not available

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STOT-single exposure: Data not available

Aspiration hazard: Data not available

STOT-repeated exposure: Data not available

Potential health effects:

Inhalation: May be harmful if inhaled.

Ingestion: May be harmful if swallowed.

Skin: May cause irritation.

Eyes: May cause irritation.

Signs and symptoms of exposure: To the best of our knowledge the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

Additional information: RTECS #: Data not available

Section 12 Ecological Information

Toxicity to fish: No data available

Toxicity to daphnia and other aquatic invertebrates: No data available

Toxicity to algae: No data available

Persistence and degradability: No data available

Bioaccumulative potential: No data available

Mobility in soil: No data available

PBT and vPvB assessment: No data available

Other adverse effects: An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

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Section 14 Transport Information

UN/NA number: Not applicable

Shipping name: Not Regulated

Hazard class: Not applicable

Packing group: Not applicable

Reportable Quantity: No

Marine pollutant: No

Exceptions: Not applicable

2012 ERG Guide # Not applicable

Section 15 Regulatory Information

A chemical is considered to be listed if the CAS number for the anhydrous form is on the Inventory list.

Component	TSCA	CERLCA (RQ)	RCRA code	DSL	NDSL	WHMIS Classification
Bromothymol blue, sodium salt	Listed	Not Listed	Not Listed	Listed	Not Listed	Not Listed

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Revision Date: July 18, 2018 Supersedes: