

# Treatment of a Nineteenth Century Creamware Plate:

*Investigating the use of CO<sub>2</sub> Dry Ice and Gellan Gum in Adhesive Removal  
and Iron Stain Reduction*

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# Table of Contents

<b>Acknowledgements</b>	1
<b>Introduction</b>	3-5
<b>Description of Artifact</b>	5
<b>Proposed Treatment</b>	6-19
Experimentation	6-8
Treatment	8-19
Mould Removal	10-12
Stain Reduction	12-15
Gellan Gum	15-20
<b>Application</b>	18
<b>Poultice Preparation</b>	18-20
<b>Treatment Observations</b>	19-23
<b>Bibliography</b>	24-26
<b>Appendix I</b> Condition Report	27-29
<b>Appendix II</b> Treatment Photography	29-30
Before Treatment	28-29
After Treatment	30
<b>Appendix III</b> Safety Data Sheets	31-53

## Introduction

In 1978, the Ontario Heritage Trust<sup>1</sup> acquired the Macdonell-Williamson House, a 19th century homestead, located near the Ontario-Quebec border in Pointe-Fortune, Ontario.<sup>2</sup> The village once spanned the border, homesteads having been erected on both sides of the Ottawa River. Today, only a few buildings stand on the Ontario divide, the MacDonell house among them.

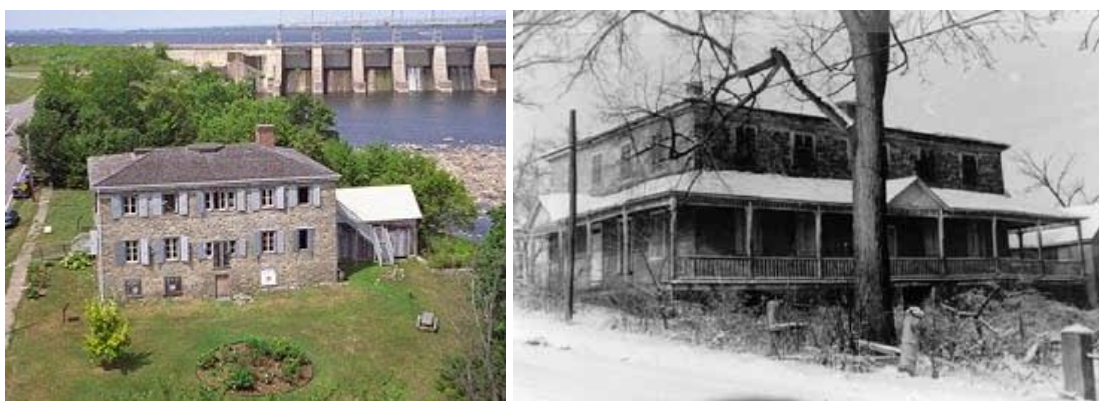


Figure 1: The Macdonell-William house (left), Carl Bigras, <http://www.mwhouse.ca/house.html>, date accessed October 16th 2019, General view of the house (right) © Parks Canada Agency, 1969.

The story of John Macdonell exhibits many defining aspects of 19th century Canadian history. He immigrated from Scotland, arriving in the United States where he resided for a short period, leaving after the American Revolutionary War.<sup>3</sup> For 19 years, John worked as a fur trader, under the Northwest Fur Trade Company. In addition, he served as a British Captain during the War of 1812, before settling in Pointe-Fortune. Here, he became a businessman, a judge and a member of the Canadian House of Assembly.<sup>4</sup> His wife, Magdeleine Poitras was a Metis woman who originated from an

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<sup>1</sup> The Ontario Heritage Trust is a non-profit organization which works to “promote and protect the tangible resources of artifacts, properties, buildings, structures and landscapes...” which encompass the heritage of the province of Ontario (Frank 1987)

<sup>2</sup> (Doroszenko 2016, Parks Canada n.d, Redfern n.d.)

<sup>3</sup> (Doroszenko 2016, Parks Canada, Redfern n.d)

<sup>4</sup> (Doroszenko 2016, Redfern n.d.)

English and French community. Subsequent families (e.g. Williamson) resided in the homestead between the 19th and 20th centuries. Today, the property serves the public as an historic house museum.



Figure 2: Image of interior of house. A portrait of the father of John Macdonell sits above the fireplace. Francis Labbe (Radio-Canada), 2017.

To better understand the archaeological record on site as well as the significance of the property, archaeological excavations were conducted in 1982, and thereafter.<sup>5</sup> In 1982, fragments of an early 19th century creamware plate was uncovered in the damp kitchen basement of the property. The layer of red-brown soil in which the sherds were discovered are contemporaneous with John MacDonnell, making this artifact one of the earliest recovered on site that can be exhibited.

The intent of the museum was to have the artifact treated in time for the 200<sup>th</sup> year anniversary of the property in 2017 which coincided with the 150<sup>th</sup> anniversary of

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<sup>5</sup> (Doroszenko 2016, Parks Canada n.d.)

Canada. Though this window has passed, it is likely that the object will be on display at some point during its continued life.

### Description of Artifact

The ceramic is an early 19th century creamware plate with a plain rim. The object is broken into 30 pieces, though partially mended into four separate groupings. Each fragment is labelled with an identification number and each number is unique. The ceramic is dirty and broken; staining (purple and black) and discolouration is present throughout. There are missing fragments. The edges have small chips, cracks, missing glaze areas and spalls. The purple stain has been identified by the client as fusarium mould. The adhesive previously used is unknown but likely a Poly (vinyl acetate) solution (PVAc). Fusarium mould is a biological hazard. The client wishes for the mould to be removed. Personal protective equipment (PPE) worn during examination of artifact.



Figure 3: BT Recto (left) and Verso (right) of Plate. Germain Wiseman, CCI 2019.<sup>6</sup>

<sup>6</sup> Note: an additional two fragments were bagged with the ceramic and shipped to CCI for treatment. These fragments do not belong to the plate, though they were documented with the vessel. Both sherds were treated for mould due to their proximity, and bagged separate from the plate fragments.

## Proposed Treatment<sup>7</sup>

*Treatment proposal was approved by client on September 13<sup>th</sup>, 2019.*

1. Determine adhesive used by solvent testing
2. Remove identification numbers if necessary
3. Remove old adhesive and clean joins
4. Kill Fusarium mould
5. Reduce or remove staining and clean
6. Re-mend with suitable adhesive (likely Paraloid B-72)
7. Fills only if structurally required
8. Reapply identification numbers.

## Experimentation

Poly (vinyl acetate) solutions (PVAc) are colourless, odourless, non-toxic thermoplastic resins that have been commercially available since the 1930s and have been used in the conservation field for various purposes such as paint consolidants and adhesives.<sup>8</sup> PVAc's glues are mechanically removed. This is a tedious task. In lieu of this, I will experiment with alternative methods of adhesive removal: CO<sub>2</sub> dry ice treatment. This method has been used to clean ceramics, among other archaeological materials, though it has not been used in the removal of adhesives from a ceramic object.<sup>9</sup> In this project, I will test the effectiveness of this technique when deployed on PVAc adhesives.

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<sup>7</sup> Prior to treatment, object was documented: photographed and condition reported (see Appendix I)

<sup>8</sup> (Cool Conservation 1994, Down 2007)

<sup>9</sup> (Molen *et al.* 2011, Spur *et al.* 1999)

Dry Ice blasting is a non-toxic, non-abrasive cleaning method. It utilizes a pressurized airstream which emits dry ice pellets or particles at a rate (psi) and particulate size selected by the user. This media consists of solid carbon dioxide (CO<sub>2</sub>) at a temperature of -78.5°C.<sup>10</sup> Once surface contact is made, no residue is left by the blasting medium. This is in result of sublimation of the dry ice (i.e., it reaches the gaseous phase) as it hits the surface of the object.<sup>11</sup> This method of cleaning has been widely used in the industrial field since the 1980s.

The working properties in dry-ice blasting are dependant upon thermal and kinetic energy input as well as sublimation energy.

“The thermal energy supplied during the cleaning process leads [...] to a regional undercooling of the part where the pellets hit the surface. As a result, elasticity is lost and the adhering coating becomes embrittled and shrinks while forming cracks” (Spur 1999).

The thermal expansion of the coating (e.g. corrosion, adhesive, etc.) is different from that of the substrate, resulting in a breakage of the bond between the object and the coating. In addition, kinetic energy of dry-ice pellets contributes to the separation between the object and coating.<sup>12</sup> Long periods of localized usage of the machine can lead to a reduction of the removal rate as the temperature difference between the surface of the object and the coating equalizes.<sup>13</sup> In theory, the thermal

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<sup>10</sup> (Molen 2011, Spur 1999)

<sup>11</sup> (Spur 1999)

<sup>12</sup> (Molen 2011, Spur 1999)

<sup>13</sup> (Molen 2011)

expansion of the PVAc glue will differ from that of the ceramic body, this difference will allow for an easier mechanical separation of the two materials.



Figure 4: Test fragments from CCI Archaeology lab teaching collection, post adhesive application.

A PVA glue (Helmibond 0847 Premium Solid Wood Glue) was brushed along the edges of ceramic fragments. Several fragments were mended. A singular sherd was selected for experimentation with CO<sub>2</sub> dry ice. Equipment selected: Cold Jet, i<sup>3</sup> MicroClean<sup>®14</sup> which utilizes a dry ice block, releasing the material in small pellets. Nozzle was held three inches from ceramic fragment, (blast pressure 40 psi, feed rate 0.4 lbs/min). Testing was conducted under a fume hood, PPE (sound guard, eye protection) was worn at all times. The dry ice treatment was ineffective at adhesive removal. No changes were observed and the removal was not made easier.

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<sup>14</sup> For further information regarding equipment used visit MicroClean Website: <https://www.coldjet.com/our-equipment>



## Treatment

The extent of the *fusarium* mould is unknown. In order to properly assess and treat the contaminate, a reversal of previous mends is required. Mould is present within the fabric of the ceramic, and in between joints. Mends must be undone and all adhesive removed prior to mould eradication.

The removal of an adhesive is dependent on identification of that adhesive. Physical properties such as colour or hardness, “[...] together with their solubility in a range of solvents, will enable identification of most adhesives.”<sup>15</sup> PVAc’s have commonly been used in the form of emulsions. Depending on the age of the adhesive, it may appear slightly brown, white or clear in colour. If clear, the PVA emulsion will turn white once immersed in water. The glue may feel brittle or slightly rubbery depending on its age and it’s original plasticity. Effective solvents for removal are warm water or acetone.<sup>16</sup>

The adhesive present on the ceramic appears clear, though it is white and opaque in areas where excessive amounts were used. The solubility of the adhesive was tested by means of hand rolled cotton wool swabs immersed in warm water and acetone. Adhesive was found to be slightly soluble in both acetone and warm water.

Ceramic fragments were submerged in a warm water bath. The adhesive present was softened, and joints were carefully separated. The chosen solvent (warm water) effectively softened and swelled the adhesive, allowing for the sherds to be pulled

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<sup>15</sup> (Oakley & Jain 2002)

<sup>16</sup> (Buys & Oakley 1993, Down 2007, Oakley & Jain 2002)

apart. Once wet, the clear glue appeared white and became gummy. These characteristics enabled the identification of this adhesive as a PVA emulsion.

Mechanical removal of adhesive followed with a scalpel. Acetone was applied when required to further soften the glue. Care was taken during this removal to avoid scratching the ceramic; causing damage to the body and glaze. Following adhesive removal, sherds were swabbed with acetone and hand-rolled cotton wool swabs. Any accerations present were mechanically removed under a microscope.

### **Mould Removal**

*Fusarium* is a large genus of filamentous fungi, consisting minimally of 70 recognized species. *Fusarium* requires wet conditions to form, and cultivates in damp areas.<sup>17</sup> Characteristically, the texture of this mold varies from flat to cottony, while the colour ranges from “white, tan and salmon to cinnamon, yellow, red-violet, pink or purple.”<sup>18</sup> Though, more commonly found outside, fusarium can form indoors. The mold multiples by the dispersion of airborne microscopic spores.

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<sup>17</sup> (Cool Conservation 1994, Florian 2002, Ward 2018)

<sup>18</sup> (Ward 2018)



Figure 5: Microscopic image of pink fusarium hyphae. Image courtesy of Shutterstock.

Fusarium molds will rarely affect the health of most individuals, however, those sensitive to mould may develop serious health symptoms if exposed. Fusarium is an allergen; spore inhalation may lead to sinusitis. In addition, a number of diseases have been linked in connection to this mold, “includ[ing] localized infections of the skin and nails (onychomycosis) and eye infections (keratomycosis), which commonly affect[s] lens wearers.”<sup>19</sup> Furthermore, fusarium can lead to pneumonia, thrombophlebitis, endophthalmitis, septic arthritis and osteomyelitis. Fusarium infection can potentially be deadly to those with a weak immune system, (e.g. cancer patients, etc.).<sup>20</sup>

The mold is apparent on multiple fragments of the ceramic: present along break edges, the body as well as glazed areas. The fusarium is characteristically flat and pink-purple in colour.

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<sup>19</sup> (Ward 2018)

<sup>20</sup> (Ward 2018)



Figure 6: Detail of mold present on several fragments of ceramic. Germain Wiseman, CCI 2019.

Mary-Lou Florian (2002) suggests the use of alcohol and distilled water to remove mould, specifically 70% isopropanol or 70% ethanol to 30% water. The author claims that lower concentrations of alcohol are less effective than 70%.

Following adhesive removal, ceramic fragments were submerged in a 70% isopropyl alcohol and 30% Reverse Osmosis (RO) water bath. The object was treated in the fume hood to reduce the potential spread of spores, and to prevent the inhalation of the alcohol which may cause drowsiness or dizziness if exposed to concentrations above the exposure limit.<sup>21</sup> PPE included protective gloves (nitrile) and safety glasses.

Fragments were submerged for a period of 2.5 hours, followed by an overnight rinsing period in RO water. The holding tray was covered with fitted tupperware lid to lower the evaporation rate of the solution, thus lengthening the time of exposure to

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<sup>21</sup> Appendix III Safety Data Sheet

the alcohol. It was observed that pink-purple *fusarium* stain was greatly reduced: about 95% of the stain had been removed by the mould remedial treatment.

### **Stain Reduction**

Though active growth has been removed, discolouration and staining are present throughout the fragments. Cool Conservation (1994) notes, “many conservators have found that the only means to diminish dark yellow and purple staining caused by fungi is the use of bleaching solutions.” Hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) a bleaching agent, was selected for this purpose. Sherds were soaked in RO water for one hour prior to a 3% hydrogen peroxide bath. Fragments were pre-soaked in order to saturate the ceramic body and dissolve the stains present. Immersion was chosen in lieu of poulticing due to the degree of staining present throughout the body as well as the glaze interruptions: crazing, chips and areas of glaze loss. The holding tray was sealed with a fitted tupperware lid and fragments were soaked for a period of 2.5 hours.



Figure 7: Preparing sherds for 3% hydrogen peroxide soak. CCI, B. Houghton 2019.

When bleaching with hydrogen peroxide, stains may potentially be rendered colourless and inaccessible cracks and break edges may be cleaned. As it is exposed to air, the hydrogen peroxide breaks down, forming water and active oxygen; the organic residues are oxidized, causing the removal of colour.<sup>22</sup>

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<sup>22</sup> (Oakley & Kamal 2002, Rodgers 2004)



Figure 8 : RO water rinse, following 3% hydrogen peroxide soak.

Following the use of the bleaching agent, the objects must be thoroughly soaked in water to remove any remaining stain residues.<sup>23</sup> Treatment was successful in brightening the fragments, though stain reduction was minimal. The ceramic fabric in particular was significantly lightened. To address the staining, a poultice method utilizing cotton wool saturated in 3% hydrogen peroxide was selected. The stained sherds were wrapped in cotton wool, followed by plastic wrapping and then sealed into a polyethylene bag.

A poultice works by mobilising the dirt or stain with the use of a solvent. The solvent, “[...] together with the dirt can be drawn out into a poultice or a pack. Evaporation of the solvent at the surface of the poultice leaves the dirt remaining in the poultice rather than the body and dissolves the stain.”<sup>24</sup> Fragments were poulticed for a

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<sup>23</sup> (Buys & Oakley 1993, Oakley & Jain 2002: 53, Rodgers 2004)

<sup>24</sup> (Oakley & Jain 2002)

period of 3 hours. No changes to the ceramic body were observed during this time. No discoloration was present on the poulticing materials; cotton wool remained white. Poulticing was ineffective.

## **Gellan Gum**

In the field of paper conservation, the use of polysaccharide hydro-gels is becoming increasingly popular. Gellan gum, a water soluble, naturally occurring, straight chain polysaccharide, forms a gel in aqueous solutions.<sup>25</sup> There are two grades of gellan gum: high and low acyl content. The acyl group dictates many of the gel's properties, including firmness and elasticity.<sup>26</sup> Low acyl gel is more common place in the heritage conservation field. In its raw form, the gum is a white, non-toxic, odourless powder. When mixed with water and heated, the gel becomes hydrated. Once cooled, a clear and transparent gel is formed.<sup>27</sup> Low-acyl gum hydrates between 75-100°C and sets below 50°C. Gellan gum remains stable with the addition of various additives. It can be utilized as a carrier for a variety of chemical treatments, and is useful for localized application as a poultice material.<sup>28</sup>

Staining on archaeological ceramics can arise from a number of factors including burial environment and porosity of the ceramic body. The use of chelators such as ethylenediaminetetraacetic acid (EDTA), diethylenetriamine pentaacetic acid (DTPA) and sodium citrate are frequently recommended for the removal of iron stains.<sup>29</sup>

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<sup>25</sup> (Maitland *et al.* 2018, Baron & McGrath 2019)

<sup>26</sup> (Baron & McGrath 2019)

<sup>27</sup> (Maitland *et al.* 2018)

<sup>28</sup> (Maitland *et al.* 2018 & Porteous 2018:5)

<sup>29</sup> (Buys & Oakley 1993, Oakley & Jain 2002, Rodgers 2006, Selwyn and Tse, 2008)



Chelating agents work by mobilizing metal ions from their insoluble compounds, combining with them and forming complexes that are then rinsed from the artifact.<sup>30</sup> Care should be taken when using a chelating agent as it may attack metal ions that naturally occur within the ceramic glaze and body. A study by Selwyn (2013) found that a combination of a chelator and the reducing agent SDT (sodium dithionite) enhance the reduction of iron stain removal. Reducing agents reduce the insoluble, rust-coloured iron (III) ion to the colourless, soluble iron (II) ion, becoming more accessible to the chosen chelator.<sup>31</sup> Following treatment, the ceramic must be thoroughly rinsed as any iron (II) ions remaining in the body of the ceramic will reoxidize over time, becoming the rust-coloured iron (III) ion and reforming the stain.<sup>32</sup>

Following a study carried out at the Winterthur Museum<sup>33</sup> wherein poulticing was determined to be the most effective method in stain removal, Porteous (2018) undertook an exploratory project utilizing the use of gellan gum for reduction of iron stains on ceramics. Her study explored the use common chelators: EDTA, DTPA and sodium citrate, in combination with sodium dithionite, a reducing agent, applied in a gellan gum poultice. Her results found the combination of DTPA and SDT to be the most successful.<sup>34</sup>

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<sup>30</sup> (Rodgers 2006, Selwyn & *et al.* 2013)

<sup>31</sup> (Selwyn 2013)

<sup>32</sup> (Porteous 2018)

<sup>33</sup> (Pouliot *et al.* 2013)

<sup>34</sup> (Porteous 2018)

### **Application of Gellan Gum Poultice**

A study by Selwyn (2013) found that, with the addition of the reducing agent SDT, varying the concentration of the selected chelator between 2-4% had little effect, nor did the sequence in which the reducing agent and chelator were applied. In her study, Porteous (2018) immersed ceramic sherds in a 1% low acyl gellan gum, containing 5% SDT and 2% DTPA. In 2008, a study investigating the use of sodium dithionite in conservation, conducted by Selwyn and Tse found a 10% SDT solution paired with the chelator DTPA effective in the removal of iron stains from archaeological ceramics.

For this study, both concentrations (5% and 10% SDT) were tested in an effort to determine if the greater concentration of SDT is more effective at iron stain reduction.

### **Preparation of Gellan Gum Poultice**

KelcoGel, a pure low acyl gellan gum, sourced from Talas, was selected. A two step dilution method was used to form the gellan gum poultice. A solution containing 2 grams of chelator DTPA and 50 mL of RO water was heated to 50°C on a hot plate and monitored. At this time, two grams of reducing agent SDT was weighed and set aside. In a separate beaker, 0.04 g of Calcium acetate (CaAC) was stirred into 50 mL of Reverse Osmosis water. Two grams of KelcoGel was added to this solution and whisked. This solution was individually heated in a microwave oven to hydrate the gel (approximately 1 minute). Following the hydration of the gel, the heated chelator solution was added to the gellan gum immediately followed by the

premeasured SDT, minimizing the heating of the SDT and it's exposure to air. These factors contribute to the oxidative degradation of sodium dithionite.<sup>35</sup> The solution was quickly stirred and casted. Once set, a 2% low acyl gellan gum, containing 10% SDT and 2% DTPA was formed. The same procedure was repeated, using a halved amount of SDT to form a 2% low acyl gellan gum containing 5% SDT and 2% DTPA. Once set, the poultice was cut to size and placed directly onto the stained sherds, wrapped in saran wrap and placed in a polyethylene bag.



Figure 9: Gellan gum applied to sherds, wrapped in plastic cling wrap and sealed within a polyethylene bag.

Sherds were left under the gellan gum poultice for varying time periods (1 day - 8 days) depending on the severity of the stains. The sherds were then rinsed for a period of 3-5 days in reverse osmosis water (RO). Water was changed three times per day. No difference in effectiveness was observed between the 5% and 10% poultice.

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<sup>35</sup> (Porteous 2018)



Figure 10: Sherds after 8 days of poulticing. Note the yellowing of the gellan gum.

### Treatment Observations



Figure 11: Sherds prior to gellan gum treatment (left), sherds following treatment.

Treatment was successful. All sherds selected for poulticing were lightened. Stains were significantly reduced and/or removed completely. The gellan gum turned a mild yellow to dark rust colour as materials were leached out of the sherds.



Figure 12: Plate rim fragment before treatment (top) after treatment (bottom).



Figure 13: Plate fragments before treatment (left) after treatment (right).



Figure 14: Plate fragments before treatment (left) after treatment (right).

The cleaned sherds were air-dried at room temperature. Following the drying period, fragments were consolidated with 5% w/v B-72 in acetone. The registration numbers for the sherds were reapplied. Labels were printed on printer paper (Arial 6) cut to size and adhered to each fragment with 5% w/v B-72 in acetone. Excess adhesive was removed with hand-rolled cotton wool swabs and acetone. The ceramic was dry

fitted prior to repair. Joins were adhered together with 50% w/v B-72 in acetone. The process was documented as requested by the client.

In summary, the treatment was successful: *fusarium* mould was removed, stains were greatly reduced and the ceramic was consolidated and repaired. The use of CO<sub>2</sub> dry ice in the removal of adhesive was ineffective. Gellan gum, combined with a chelator and reducing agent was determined to be an effective poulticing material in the reduction of iron stains from archaeological ceramics.

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**APPENDIX I Condition Report**

<b>Borden#</b> BjFo-2	<b>Field#</b>	<b>CCI#</b> 129312
<b>Object:</b> Plate		<b>Material:</b> Ceramic
<b>Dimensions (cm):</b>	Diameter: 26 Height: 3.1	<b>Institution:</b> Ontario Heritage Trust
<b>Description/Condition:</b>		<b>Date:</b> Sept 3, 2019
<ul style="list-style-type: none"> <li>- Ceramic is a 19th century creamware plate</li> <li>- Object is broken into 30 pieces, though partially mended into four separate groupings.</li> <li>- Fusarium mould present on recto and verso (analysis done by museum)</li> <li>- Black ink labels present on the verso of each individual sherd.</li> <li>- Discolouration and staining present throughout.</li> </ul>		
<b>Excavation Information:</b>		
<b>Dry/Wet Packed:</b> Support ___ Moss ___ Saran ___ Foil ___ Ziplock ___ Other _____		
<b>Other Information:</b>		



# SIGMA-ALDRICH

sigma-aldrich.com


## SAFETY DATA SHEET

Version 5.4  
Revision Date 06/21/2018  
Print Date 10/04/2019

### 1. PRODUCT AND COMPANY IDENTIFICATION

- 1.1 Product identifiers**
- Product name : Diethylenetriaminepentaacetic acid
- Product Number : D6518
- Brand : Sigma-Aldrich
- CAS-No. : 67-43-6
- 1.2 Relevant identified uses of the substance or mixture and uses advised against**
- Identified uses : Laboratory chemicals, Synthesis of substances
- 1.3 Details of the supplier of the safety data sheet**
- Company : Sigma-Aldrich Canada Co.  
2149 Winston Park Drive  
OAKVILLE ON L6H 6J8  
CANADA
- Telephone : +1 9058299500
- Fax : +1 9058299292
- 1.4 Emergency telephone number**
- Emergency Phone # : +1-703-527-3887 (CHEMTREC)

### 2. HAZARDS IDENTIFICATION

- 2.1 Classification of the substance or mixture**
- GHS Classification in accordance with Hazardous Products Regulations (HPR) (SOR/2015-17)**
- Acute toxicity, Inhalation (Category 4), H332
- Eye irritation (Category 2A), H319
- Reproductive toxicity (Category 2), H361
- Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Respiratory Tract, H373
- For the full text of the H-Statements mentioned in this Section, see Section 16.
- 2.2 GHS Label elements, including precautionary statements**
- Pictogram 
- Signal word : Warning
- Hazard statement(s)
- |      |   |
|------|---|
| H319 | Causes serious eye irritation.  |
| H332 | Harmful if inhaled.   |
| H361 | Suspected of damaging fertility or the unborn child.  |
| H373 | May cause damage to organs (Respiratory Tract) through prolonged or repeated exposure if inhaled. |
- Precautionary statement(s)
- |      |   |
|------|---|
| P201 | Obtain special instructions before use.                                   |
| P202 | Do not handle until all safety precautions have been read and understood. |
| P260 | Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.                     |
| P264 | Wash skin thoroughly after handling.                                      |

P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

**2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none**

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

**3.1 Substances**

Formula	: C <sub>14</sub> H <sub>23</sub> N <sub>3</sub> O <sub>10</sub>
Molecular weight	: 393.35 g/mol
CAS-No.	: 67-43-6
EC-No.	: 200-652-8
Registration number	: 01-2119497281-34-XXXX

**Hazardous components**

Component	Classification	Concentration*
<b>N-Carboxymethyliminobis(ethylenitrilo)tetra(acetic acid)</b>	Acute Tox. 4; Eye Irrit. 2A; Repr. 2; STOT RE 2; H319, H332, H361, H373	90 - 100 %
* Weight percent		

For the full text of the H-Statements mentioned in this Section, see Section 16.

**4. FIRST AID MEASURES**

**4.1 Description of first aid measures**

**General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**

Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**

No data available

**5. FIREFIGHTING MEASURES**

**5.1 Extinguishing media**

**Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

- 5.2 **Special hazards arising from the substance or mixture**  
No data available
- 5.3 **Advice for firefighters**  
Wear self-contained breathing apparatus for firefighting if necessary.
- 5.4 **Further information**  
No data available

---

## 6. ACCIDENTAL RELEASE MEASURES

- 6.1 **Personal precautions, protective equipment and emergency procedures**  
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.  
For personal protection see section 8.
- 6.2 **Environmental precautions**  
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.
- 6.3 **Methods and materials for containment and cleaning up**  
Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.
- 6.4 **Reference to other sections**  
For disposal see section 13.

---

## 7. HANDLING AND STORAGE

- 7.1 **Precautions for safe handling**  
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.  
Provide appropriate exhaust ventilation at places where dust is formed.  
For precautions see section 2.2.
- 7.2 **Conditions for safe storage, including any incompatibilities**  
Keep container tightly closed in a dry and well-ventilated place.  
  
Keep in a dry place.  
Storage class (TRGS 510): 13: Non Combustible Solids
- 7.3 **Specific end use(s)**  
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

- 8.1 **Control parameters**
- 8.2 **Exposure controls**
- Appropriate engineering controls**  
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.
- Personal protective equipment**
- Eye/face protection**  
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
- Skin protection**  
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
- Full contact  
Material: Nitrile rubber  
Minimum layer thickness: 0.11 mm  
Break through time: 480 min  
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)
- Splash contact

Material: Nitrile rubber  
Minimum layer thickness: 0.11 mm  
Break through time: 480 min  
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |   |   |
|---|---|
| a) Appearance                                   | Form: powder  |
| b) Odour  | odourless   |
| c) Odour Threshold                              | No data available                                   |
| d) pH   | 2.5 at 10 g/l at 23 °C (73 °F)                      |
| e) Melting point/freezing point                 | 219 - 220 °C (426 - 428 °F)                         |
| f) Initial boiling point and boiling range      | No data available                                   |
| g) Flash point                                  | 200 °C (392 °F) - closed cup                        |
| h) Evaporation rate                             | No data available                                   |
| i) Flammability (solid, gas)                    | No data available                                   |
| j) Upper/lower flammability or explosive limits | No data available                                   |
| k) Vapour pressure                              | No data available                                   |
| l) Vapour density                               | No data available                                   |
| m) Relative density                             | No data available                                   |
| n) Water solubility                             | 5 g/l at 20 °C (68 °F) 13 g/l at 50 °C (122 °F)     |
| o) Partition coefficient: n-octanol/water       | log Pow: -4.90                                      |
| p) Auto-ignition temperature                    | 387 - 397 °C (729 - 747 °F) at 1,013 hPa (760 mmHg) |
| q) Decomposition temperature                    | No data available                                   |
| r) Viscosity                                    | No data available                                   |
| s) Explosive properties                         | No data available                                   |
| t) Oxidizing properties                         | No data available                                   |



## 9.2 Other safety information

Bulk density	ca.625 kg/m <sup>3</sup> at 20 °C (68 °F)
Dissociation constant	ca.1.79 at 20 °C (68 °F)

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

No data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

No data available

### 10.4 Conditions to avoid

No data available

### 10.5 Incompatible materials

Strong oxidizing agents

### 10.6 Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Nitrogen oxides (NO<sub>x</sub>)

Other decomposition products - No data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - > 2,000 mg/kg

Inhalation: No data available

Dermal: No data available

No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: No skin irritation

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Eye irritation

#### Respiratory or skin sensitisation

Buehler Test - Guinea pig

Did not cause sensitisation on laboratory animals.

(OECD Test Guideline 406)

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

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.

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

#### Reproductive toxicity

No data available

Suspected human reproductive toxicant Suspected of damaging the unborn child.

Developmental Toxicity - Rat - Oral

Specific Developmental Abnormalities: Musculoskeletal system.

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**Aspiration hazard**

No data available

**Additional Information**

RTECS: MB8205000

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

---

**12. ECOLOGICAL INFORMATION**

**12.1 Toxicity**

Toxicity to fish flow-through test LC50 - Leuciscus idus (Golden orfe) - > 100 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates static test EC50 - Daphnia (water flea) - 245 mg/l - 48 h (OECD Test Guideline 202)

**12.2 Persistence and degradability**

Biodegradability Biotic/Aerobic - Exposure time 28 d  
Result: 20 - 60 % - According to the results of tests of biodegradability this product is not readily biodegradable.  
(CO2 Evolution Test)

**12.3 Bioaccumulative potential**

Indication of bioaccumulation.

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**

No data available

---

**13. DISPOSAL CONSIDERATIONS**

**13.1 Waste treatment methods**

**Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION**

**TDG (Canada)**

Not dangerous goods

**IMDG**

Not dangerous goods

**IATA**

Not dangerous goods

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**15. REGULATORY INFORMATION**

This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all the information required by the HPR.

---

**16. OTHER INFORMATION**

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Eye Irrit.	Eye irritation
H319	Causes serious eye irritation.
H332	Harmful if inhaled.
H361	Suspected of damaging fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure if inhaled.
Repr.	Reproductive toxicity
STOT RE	Specific target organ toxicity - repeated exposure

Further information

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Version: 5.4

Revision Date: 06/21/2018

Print Date: 10/04/2019

### SECTION 1: Identification

#### 1.1. Identification

Product form	: Substance
Substance name	: Isopropyl Alcohol (2-Propanol)
CAS-No.	: 67-63-0
Product code	: LC15750
Formula	: C3H8O
Synonyms	: 1-methylethanol / 1-methylethyl alcohol / 2-hydroxypropane / dimethyl carbinol / ethyl carbinol / hydroxypropane / IPA / i-propanol / isoethylcarbinol / propan-2-ol / sec-propanol

#### 1.2. Recommended use and restrictions on use

Use of the substance/mixture	: Disinfectant Solvent
------------------------------	---------------------------

#### 1.3. Supplier

LabChem Inc  
Jackson's Pointe Commerce Park Building 1000, 1010 Jackson's Pointe Court  
Zelienople, PA 16063 - USA  
T 412-826-5230 - F 724-473-0647  
[info@labchem.com](mailto:info@labchem.com) - [www.labchem.com](http://www.labchem.com)

#### 1.4. Emergency telephone number

Emergency number	: CHEMTREC: 1-800-424-9300 or 011-703-527-3887
------------------	--

### SECTION 2: Hazard(s) identification

#### 2.1. Classification of the substance or mixture

##### GHS-US classification

Flammable liquids Category 2	H225	Highly flammable liquid and vapour
Serious eye damage/eye irritation Category 2A	H319	Causes serious eye irritation
Specific target organ toxicity (single exposure) Category 3	H335	May cause respiratory irritation

Full text of H statements : see section 16

#### 2.2. GHS Label elements, including precautionary statements

##### GHS-US labeling

Hazard pictograms (GHS-US)



Signal word (GHS-US)

: Danger

Hazard statements (GHS-US)

: H225 - Highly flammable liquid and vapour  
H319 - Causes serious eye irritation  
H335 - May cause respiratory irritation

Precautionary statements (GHS-US)

: P210 - Keep away from heat, hot surfaces, open flames, sparks. - No smoking.  
P233 - Keep container tightly closed.  
P240 - Ground/bond container and receiving equipment.  
P241 - Use explosion-proof electrical, lighting, ventilating equipment  
P242 - Use only non-sparking tools.  
P243 - Take precautionary measures against static discharge.  
P261 - Avoid breathing mist, vapors, spray.  
P264 - Wash exposed skin thoroughly after handling.  
P271 - Use only outdoors or in a well-ventilated area.  
P280 - Wear eye protection, face protection, protective clothing, protective gloves.  
P303+P361+P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.  
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact

# Isopropyl Alcohol (2-Propanol)

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

lenses, if present and easy to do. Continue rinsing  
P312 - Call a POISON CENTER or doctor/physician if you feel unwell.  
P337+P313 - If eye irritation persists: Get medical advice/attention.  
P370+P378 - In case of fire: Use dry chemical powder, alcohol-resistant foam, carbon dioxide (CO<sub>2</sub>) to extinguish  
P403+P233 - Store in a well-ventilated place. Keep container tightly closed.  
P405 - Store locked up.  
P501 - Dispose of contents/container to comply with local, state and federal regulations  
P235 - Keep cool.  
If inhaled: Remove person to fresh air and keep comfortable for breathing

### 2.3. Other hazards which do not result in classification

Other hazards not contributing to the classification : None.

### 2.4. Unknown acute toxicity (GHS US)

Not applicable

## SECTION 3: Composition/Information on ingredients

### 3.1. Substances

Substance type : Mono-constituent

Name	Product identifier	%	GHS-US classification
Isopropyl Alcohol (2-Propanol) (Main constituent)	(CAS-No.) 67-63-0	100	Fam. Liq. 2, H225 Eye Irrit. 2A, H319 STOT SE 3, H335

Full text of hazard classes and H-statements : see section 16

### 3.2. Mixtures

Not applicable

## SECTION 4: First-aid measures

### 4.1. Description of first aid measures

First-aid measures general : Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with labored breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital. Never give alcohol to drink.

First-aid measures after inhalation : Remove the victim into fresh air. Respiratory problems: consult a doctor/medical service.

First-aid measures after skin contact : Rinse with water. Soap may be used. Do not apply (chemical) neutralizing agents. Take victim to a doctor if irritation persists.

First-aid measures after eye contact : Rinse immediately with plenty of water. Do not apply neutralizing agents. Take victim to an ophthalmologist if irritation persists.

First-aid measures after ingestion : Rinse mouth with water. Immediately after ingestion: give lots of water to drink. Do not induce vomiting. Give activated charcoal. Call Poison Information Centre ([www.big.be/antigif.htm](http://www.big.be/antigif.htm)). Consult a doctor/medical service if you feel unwell. Ingestion of large quantities: immediately to hospital. Doctor: gastric lavage.

### 4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects after inhalation : EXPOSURE TO HIGH CONCENTRATIONS: Coughing. Dry/sore throat. Central nervous system depression. Dizziness. Headache. Narcosis.

Symptoms/effects after skin contact : Dry skin.

Symptoms/effects after eye contact : Irritation of the eye tissue.

Symptoms/effects after ingestion : AFTER ABSORPTION OF LARGE QUANTITIES: Central nervous system depression. Headache. Dilation of the blood vessels. Low arterial pressure. Nausea. Vomiting. Abdominal pain. Disturbed motor response. Disturbances of consciousness. FOLLOWING SYMPTOMS MAY APPEAR LATER: Body temperature fall. Slowing respiration.

Chronic symptoms : ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Red skin. Dry skin. Itching. Cracking of the skin. Skin rash/inflammation. Impaired memory.

### 4.3. Immediate medical attention and special treatment, if necessary

No additional information available

# Isopropyl Alcohol (2-Propanol)

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### SECTION 5: Fire-fighting measures

#### 5.1. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media : Water spray. Polyvalent foam. Alcohol-resistant foam. BC powder. Carbon dioxide.  
Unsuitable extinguishing media : Solid water jet ineffective as extinguishing medium.

#### 5.2. Specific hazards arising from the chemical

Fire hazard : DIRECT FIRE HAZARD. Highly flammable. Gas/vapor flammable with air within explosion limits. INDIRECT FIRE HAZARD. May be ignited by sparks. Gas/vapor spreads at floor level: ignition hazard.  
Explosion hazard : DIRECT EXPLOSION HAZARD. Gas/vapour explosive with air within explosion limits. INDIRECT EXPLOSION HAZARD. may be ignited by sparks. Reactions with explosion hazards: see "Reactivity Hazard".  
Reactivity : Upon combustion: CO and CO<sub>2</sub> are formed. Violent to explosive reaction with (strong) oxidizers. Prolonged storage/in large quantities: may form peroxides.

#### 5.3. Special protective equipment and precautions for fire-fighters

Firefighting instructions : Cool tanks/drums with water spray/remove them into safety. Do not move the load if exposed to heat.  
Protection during firefighting : Heat/fire exposure: compressed air/oxygen apparatus.

### SECTION 6: Accidental release measures

#### 6.1. Personal precautions, protective equipment and emergency procedures

##### 6.1.1. For non-emergency personnel

Protective equipment : Gloves. Protective goggles. Protective clothing. Large spills/in enclosed spaces: compressed air apparatus. See "Material-Handling" to select protective clothing.  
Emergency procedures : Keep upwind. Mark the danger area. Consider evacuation. Seal off low-lying areas. Close doors and windows of adjacent premises. Stop engines and no smoking. No naked flames or sparks. Spark- and explosion-proof appliances and lighting equipment. Keep containers closed. Wash contaminated clothes.

##### 6.1.2. For emergency responders

Protective equipment : Equip cleanup crew with proper protection. Do not breathe gas, fumes, vapor or spray.  
Emergency procedures : Stop leak if safe to do so. Ventilate area. If a major spill occurs, all personnel should be immediately evacuated and the area ventilated.

#### 6.2. Environmental precautions

Prevent spreading in sewers.

#### 6.3. Methods and material for containment and cleaning up

For containment : Contain released substance, pump into suitable containers. Consult "Material-handling" to select material of containers. Plug the leak, cut off the supply. Dam up the liquid spill. Try to reduce evaporation. Measure the concentration of the explosive gas-air mixture. Dilute/disperse combustible gas/vapour with water curtain. Provide equipment/receptacles with earthing. Do not use compressed air for pumping over spills.  
Methods for cleaning up : Take up liquid spill into absorbent material, e.g.: dry sand/earth/vermiculite or powdered limestone. Scoop absorbed substance into closing containers. See "Material-handling" for suitable container materials. Damaged/cooled tanks must be emptied. Do not use compressed air for pumping over spills. Carefully collect the spill/leftovers. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.

#### 6.4. Reference to other sections

No additional information available

### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

Precautions for safe handling : Comply with the legal requirements. Remove contaminated clothing immediately. Clean contaminated clothing. Handle uncleaned empty containers as full ones. Thoroughly clean/dry the installation before use. Do not discharge the waste into the drain. Do not use compressed air for pumping over. Use spark-/explosionproof appliances and lighting system. Take precautions against electrostatic charges. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Observe normal hygiene standards. Keep container tightly closed. Measure the concentration in the air regularly. Work under local exhaust/ventilation.

# Isopropyl Alcohol (2-Propanol)

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Hygiene measures	: Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Wash contaminated clothing before reuse.
<b>7.2. Conditions for safe storage, including any incompatibilities</b>	
Incompatible products	: Ammonia. Strong acids. Strong oxidizers.
Incompatible materials	: Direct sunlight. Heat sources. Sources of ignition.
Heat-ignition	: KEEP SUBSTANCE AWAY FROM: heat sources. ignition sources.
Prohibitions on mixed storage	: KEEP SUBSTANCE AWAY FROM: oxidizing agents. strong acids. (strong) bases. amines. halogens.
Storage area	: Store in a cool area. Store in a dry area. Ventilation at floor level. Fireproof storeroom. Provide for an automatic sprinkler system. Provide for a tub to collect spills. Provide the tank with earthing. May be stored under nitrogen. Meet the legal requirements.
Special rules on packaging	: SPECIAL REQUIREMENTS: closing. with pressure relief valve. dry. clean. correctly labelled. meet the legal requirements. Secure fragile packagings in solid containers.
Packaging materials	: SUITABLE MATERIAL: stainless steel. monel steel. carbon steel. copper. nickel. bronze. glass. Teflon. polyethylene. polypropylene. zinc. MATERIAL TO AVOID: steel with rubber inner lining. aluminium.

### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

Isopropyl Alcohol (2-Propanol) (67-63-0)		
ACGIH	ACGIH TWA (ppm)	200 ppm (2-propanol; USA; Time-weighted average exposure limit 8 h; TLV - Adopted Value)
ACGIH	ACGIH STEL (ppm)	400 ppm (2-propanol; USA; Short time value; TLV - Adopted Value)
OSHA	OSHA PEL (TWA) (mg/m <sup>3</sup> )	980 mg/m <sup>3</sup>
OSHA	OSHA PEL (TWA) (ppm)	400 ppm
IDLH	US IDLH (ppm)	2000 ppm
NIOSH	NIOSH REL (TWA) (mg/m <sup>3</sup> )	980 mg/m <sup>3</sup>
NIOSH	NIOSH REL (TWA) (ppm)	400 ppm
NIOSH	NIOSH REL (STEL) (mg/m <sup>3</sup> )	1225 mg/m <sup>3</sup>
NIOSH	NIOSH REL (STEL) (ppm)	500 ppm

#### 8.2. Appropriate engineering controls

Appropriate engineering controls : Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Provide adequate general and local exhaust ventilation.

#### 8.3. Individual protection measures/Personal protective equipment

##### Personal protective equipment:

Safety glasses. Gloves. Protective clothing. Face shield. High gas/vapor concentration: gas mask with filter type A.



##### Materials for protective clothing:

GIVE EXCELLENT RESISTANCE: butyl rubber. nitrile rubber. viton. polyethylene/ethylenevinylalcohol. GIVE GOOD RESISTANCE: neoprene. GIVE LESS RESISTANCE: PVC. neoprene/natural rubber. GIVE POOR RESISTANCE: natural rubber. polyethylene. PVA

##### Hand protection:

Gloves

##### Eye protection:

Safety glasses

##### Skin and body protection:

01/26/2018

EN (English US)

4/9

# Isopropyl Alcohol (2-Propanol)

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Protective clothing

### Respiratory protection:

Wear gas mask with filter type A if conc. in air  
> exposure limit

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: Liquid.
Color	: Colourless
Odor	: Alcohol odour Stuffy odour Mild odour
Odor threshold	: 3 - 610 ppm 8 - 1499 mg/m <sup>3</sup>
pH	: No data available
Melting point	: -88 °C
Freezing point	: No data available
Boiling point	: 82 °C (1013 hPa)
Critical temperature	: 235 °C
Critical pressure	: 47600 hPa
Flash point	: 12 °C
Relative evaporation rate (butyl acetate=1)	: 2.3
Relative evaporation rate (ether=1)	: 21
Flammability (solid, gas)	: No data available
Vapor pressure	: 44 hPa (20 °C)
Vapor pressure at 50 °C	: 60.2 hPa (25 °C)
Relative vapor density at 20 °C	: 2.1
Relative density	: 0.79
Relative density of saturated gas/air mixture	: 1.05
Specific gravity / density	: 785 kg/m <sup>3</sup>
Molecular mass	: 60.1 g/mol
Solubility	: Soluble in water. Soluble in ethanol. Soluble in ether. Soluble in acetone. Soluble in oils/fats. Soluble in chloroform. Water: Complete Ethanol: Complete Ether: Complete Acetone: soluble
Log Pow	: 0.05 (Weight of evidence approach; Other; 25 °C)
Auto-ignition temperature	: 399 °C
Decomposition temperature	: No data available
Viscosity, kinematic	: 2.5316 mm <sup>2</sup> /s (25 °C)
Viscosity, dynamic	: 0.002 Pa.s (25 °C)
Explosion limits	: 2 - 13 vol % 50 - 335 g/m <sup>3</sup>
Explosive properties	: No data available
Oxidizing properties	: No data available

### 9.2. Other information

Minimum ignition energy	: 0.65 mJ
Specific conductivity	: 5.8 µS/m
Saturation concentration	: 106 g/m <sup>3</sup>
VOC content	: 100 %
Other properties	: Gas/vapour heavier than air at 20°C. Clear. Volatile.



# Isopropyl Alcohol (2-Propanol)

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### SECTION 10: Stability and reactivity

#### 10.1. Reactivity

Upon combustion: CO and CO<sub>2</sub> are formed. Violent to explosive reaction with (strong) oxidizers. Prolonged storage/in large quantities: may form peroxides.

#### 10.2. Chemical stability

Stable under normal conditions.

#### 10.3. Possibility of hazardous reactions

May react violently with oxidants.

#### 10.4. Conditions to avoid

Direct sunlight. High temperature. Incompatible materials. Open flame. Sparks.

#### 10.5. Incompatible materials

Ammonia. Strong acids. Strong oxidizers.

#### 10.6. Hazardous decomposition products

Carbon dioxide. Carbon monoxide.

### SECTION 11: Toxicological information

#### 11.1. Information on toxicological effects

Likely routes of exposure : Inhalation; Skin and eye contact

Acute toxicity : Not classified

Isopropyl Alcohol (2-Propanol) (67-63-0)	
LD50 dermal rabbit	12870 mg/kg (Rabbit; Experimental value; Equivalent or similar to OECD 402; 16.4; Rabbit)
LC50 inhalation rat (mg/l)	73 mg/l/4h (Rat)
ATE US (oral)	5045 mg/kg body weight
ATE US (dermal)	12870 mg/kg body weight
ATE US (vapors)	73 mg/l/4h
ATE US (dust, mist)	73 mg/l/4h

Skin corrosion/irritation : Not classified

Serious eye damage/irritation : Causes serious eye irritation.

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Isopropyl Alcohol (2-Propanol) (67-63-0)	
IARC group	3 - Not classifiable

Reproductive toxicity : Not classified

Specific target organ toxicity – single exposure : May cause respiratory irritation.

Specific target organ toxicity – repeated exposure : Not classified

Aspiration hazard : Not classified

Symptoms/effects after inhalation : EXPOSURE TO HIGH CONCENTRATIONS: Coughing. Dry/sore throat. Central nervous system depression. Dizziness. Headache. Narcosis.

Symptoms/effects after skin contact : Dry skin.

Symptoms/effects after eye contact : Irritation of the eye tissue.

Symptoms/effects after ingestion : AFTER ABSORPTION OF LARGE QUANTITIES: Central nervous system depression. Headache. Dilatation of the blood vessels. Low arterial pressure. Nausea. Vomiting. Abdominal pain. Disturbed motor response. Disturbances of consciousness. FOLLOWING SYMPTOMS MAY APPEAR LATER: Body temperature fall. Slowing respiration.

Chronic symptoms : ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Red skin. Dry skin. Itching. Cracking of the skin. Skin rash/inflammation. Impaired memory.

# Isopropyl Alcohol (2-Propanol)

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### SECTION 12: Ecological information

#### 12.1. Toxicity

Ecology - general	: Not classified as dangerous for the environment according to the criteria of Directive 67/548/EEC. Not classified as dangerous for the environment according to the criteria of Regulation (EC) No 1272/2008.
Ecology - air	: Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009). Not included in the list of substances which may contribute to the greenhouse effect (Regulation (EC) No 842/2006). TA-Luft Klasse 5.2.5.
Ecology - water	: Ground water pollutant. Not harmful to fishes (LC50(96h) >1000 mg/l). Not harmful to invertebrates (Daphnia). Not harmful to algae (EC50 (72h) >1000 mg/l). Inhibition of activated sludge.

#### Isopropyl Alcohol (2-Propanol) (67-63-0)

LC50 fish 2	9640 mg/l (LC50; OECD 203; Fish, Acute Toxicity Test; 96 h; Pimephales promelas; Flow-through system; Fresh water; Experimental value)
EC50 Daphnia 2	13299 mg/l (EC50; Other; 48 h; Daphnia magna)
Threshold limit algae 1	> 1000 mg/l (EC50; UBA; 72 h; Scenedesmus subspicatus)

#### 12.2. Persistence and degradability

#### Isopropyl Alcohol (2-Propanol) (67-63-0)

Persistence and degradability	Readily biodegradable in water. Biodegradable in the soil. Biodegradable in the soil under anaerobic conditions. No test data on mobility of the substance available.
Biochemical oxygen demand (BOD)	1.19 g O <sub>2</sub> /g substance
Chemical oxygen demand (COD)	2.23 g O <sub>2</sub> /g substance
ThOD	2.4 g O <sub>2</sub> /g substance

#### 12.3. Bioaccumulative potential

#### Isopropyl Alcohol (2-Propanol) (67-63-0)

Log Pow	0.05 (Weight of evidence approach; Other; 25 °C)
Bioaccumulative potential	Low potential for bioaccumulation (Log Kow < 4).

#### 12.4. Mobility in soil

#### Isopropyl Alcohol (2-Propanol) (67-63-0)

Surface tension	0.021 N/m (25 °C)
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#### 12.5. Other adverse effects

No additional information available

### SECTION 13: Disposal considerations

#### 13.1. Disposal methods

Waste disposal recommendations	: Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle by distillation. Remove to an authorized waste incinerator for solvents with energy recovery. Do not discharge into surface water. Obtain the consent of pollution control authorities before discharging to wastewater treatment plants.
Additional information	: LWCA (the Netherlands): KGA category 03. Hazardous waste according to Directive 2008/98/EC.

### SECTION 14: Transport information

#### Department of Transportation (DOT)

In accordance with DOT	
Transport document description	: UN1219 Isopropyl alcohol, 3, II
UN-No.(DOT)	: UN1219
Proper Shipping Name (DOT)	: Isopropyl alcohol
Transport hazard class(es) (DOT)	: 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120

01/26/2018

EN (English US)

7/9

# Isopropyl Alcohol (2-Propanol)

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Packing group (DOT) : II - Medium Danger  
 Hazard labels (DOT) : 3 - Flammable liquid



DOT Packaging Non Bulk (49 CFR 173.xxx) : 202  
 DOT Packaging Bulk (49 CFR 173.xxx) : 242  
 DOT Special Provisions (49 CFR 172.102) : IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.  
 T4 - 2.65 178.274(d)(2) Normal..... 178.275(d)(3)  
 TP1 - The maximum degree of filling must not exceed the degree of filling determined by the following: Degree of filling =  $97 / 1 + a (tr - tf)$  Where: tr is the maximum mean bulk temperature during transport, and tf is the temperature in degrees celsius of the liquid during filling.

DOT Packaging Exceptions (49 CFR 173.xxx) : 4b;150  
 DOT Quantity Limitations Passenger aircraft/rail : 5 L  
 (49 CFR 173.27)  
 DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 60 L  
 DOT Vessel Stowage Location : B - (i) The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) "On deck only" on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.

Other information : No supplementary information available.

### SECTION 15: Regulatory information

#### 15.1. US Federal regulations

Isopropyl Alcohol (2-Propanol) (67-63-0)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory Subject to reporting requirements of United States SARA Section 313	
SARA Section 311/312 Hazard Classes	Physical hazard - Flammable (gases, aerosols, liquids, or solids) Health hazard - Serious eye damage or eye irritation Health hazard - Specific target organ toxicity (single or repeated exposure)

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

Chemical(s) subject to the reporting requirements of Section 313 or Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372.

Chemical Name	CAS-No.	Percentage
Isopropyl Alcohol (2-Propanol)	67-63-0	100%

#### 15.2. International regulations

##### CANADA

No additional information available

##### EU-Regulations

No additional information available

##### National regulations

No additional information available

#### 15.3. US State regulations

California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

### SECTION 16: Other information

Revision date : 01/26/2018

01/26/2018

EN (English US)

8/9

# Isopropyl Alcohol (2-Propanol)

## Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Full text of H-phrases: see section 16:

H225	Highly flammable liquid and vapour
H319	Causes serious eye irritation
H335	May cause respiratory irritation

- NFPA health hazard : 1 - Materials that, under emergency conditions, can cause significant irritation.
- NFPA fire hazard : 3 - Liquids and solids (including finely divided suspended solids) that can be ignited under almost all ambient temperature conditions.
- NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.



- Hazard Rating
- Health : 1 Slight Hazard - Irritation or minor reversible injury possible
- Flammability : 3 Serious Hazard - Materials capable of ignition under almost all normal temperature conditions. Includes flammable liquids with flash points below 73 F and boiling points above 100 F, as well as liquids with flash points between 73 F and 100 F. (Classes IB & IC)
- Physical : 0 Minimal Hazard - Materials that are normally stable, even under fire conditions, and will NOT react with water, polymerize, decompose, condense, or self-react. Non-Explosives.
- Personal protection : H  
H - Splash goggles, Gloves, Synthetic apron, Vapor respirator

SDS US LabChem

*Information in this SDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this SDS. The user must determine suitability of this information for his application.*

## SAFETY DATA SHEET

Creation Date 27-Nov-2010

Revision Date 04-Jun-2019

Revision Number 5

### 1. Identification

**Product Name** Sodium hydrosulfite  
**Cat No. :** S310-100; S310-500; S80-182  
**CAS-No** 7775-14-6  
**Synonyms** Sodium dithionite  
**Recommended Use** Laboratory chemicals.  
**Uses advised against** Food, drug, pesticide or biocidal product use

#### Details of the supplier of the safety data sheet

**Company**  
Fisher Scientific  
One Reagent Lane  
Fair Lawn, NJ 07410  
Tel: (201) 796-7100

**Emergency Telephone Number**  
CHEMTREC®, Inside the USA:  
800-424-9300  
CHEMTREC®, Outside the USA:  
001-703-527-3887

### 2. Hazard(s) identification

#### Classification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Self-heating substances and mixtures	Category 1
Acute oral toxicity	Category 4
Serious Eye Damage/Eye Irritation	Category 2

#### Label Elements

**Signal Word**  
Danger

**Hazard Statements**  
Self-heating; may catch fire  
Harmful if swallowed  
Causes serious eye irritation

**Precautionary Statements****Prevention**

Wash face, hands and any exposed skin thoroughly after handling  
 Do not eat, drink or smoke when using this product  
 Keep cool. Protect from sunlight  
 Wear protective gloves/protective clothing/eye protection/face protection

**Eyes**

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing  
 If eye irritation persists: Get medical advice/attention

**Ingestion**

IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell  
 Rinse mouth

**Storage**

Maintain air gap between stacks/pallets  
 Store bulk masses greater than .? kg/ .? lbs at temperatures not exceeding .? °C/ .? °F  
 Store away from other materials

**Disposal**

Dispose of contents/container to an approved waste disposal plant

**Hazards not otherwise classified (HNOC)**

Contact with acids liberates toxic gas

### 3. Composition/Information on Ingredients

Component	CAS-No	Weight %
Sodium dithionite	7775-14-6	>85

### 4. First-aid measures

<b>General Advice</b>	If symptoms persist, call a physician.
<b>Eye Contact</b>	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.
<b>Skin Contact</b>	Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.
<b>Inhalation</b>	Move to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.
<b>Ingestion</b>	Clean mouth with water and drink afterwards plenty of water. Get medical attention if symptoms occur.
<b>Most important symptoms and effects</b>	None reasonably foreseeable.
<b>Notes to Physician</b>	Treat symptomatically

### 5. Fire-fighting measures

**Unsuitable Extinguishing Media** No information available

<b>Flash Point Method -</b>	No information available No information available
<b>Autoignition Temperature</b>	Not applicable >80 °C / >176 °F
<b>Explosion Limits</b>	
<b>Upper</b>	No data available
<b>Lower</b>	No data available
<b>Sensitivity to Mechanical Impact</b>	No information available
<b>Sensitivity to Static Discharge</b>	No information available

**Specific Hazards Arising from the Chemical**

Self-heating; exposure to air may cause substance to self-heat without an energy supply.

**Hazardous Combustion Products**

Sulfur oxides

**Protective Equipment and Precautions for Firefighters**

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

**NFPA**

Health	Flammability	Instability	Physical hazards
3	3	2	N/A

**6. Accidental release measures**

**Personal Precautions** Use personal protective equipment. Ensure adequate ventilation. Avoid dust formation.  
**Environmental Precautions** Should not be released into the environment. See Section 12 for additional ecological information. Do not flush into surface water or sanitary sewer system.

**Methods for Containment and Clean Up** Sweep up or vacuum up spillage and collect in suitable container for disposal. Keep in suitable, closed containers for disposal.

**7. Handling and storage**

**Handling** Wear personal protective equipment. Ensure adequate ventilation. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Avoid dust formation.

**Storage** Keep containers tightly closed in a dry, cool and well-ventilated place. Flammables area.

**8. Exposure controls / personal protection**

**Exposure Guidelines** This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

**Engineering Measures** Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

**Personal Protective Equipment**

<b>Eye/face Protection</b>	Tightly fitting safety goggles.
<b>Skin and body protection</b>	Long sleeved clothing.
<b>Respiratory Protection</b>	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

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

### 9. Physical and chemical properties

Physical State	Powder Solid
Appearance	White
Odor	rotten-egg like
Odor Threshold	No information available
pH	8-9.5 50 g/l aq.sol
Melting Point/Range	300 °C / 572 °F
Boiling Point/Range	No information available
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	1.4
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	Not applicable >80 °C / >176 °F
Decomposition Temperature	No information available
Viscosity	Not applicable
Molecular Formula	Na <sub>2</sub> O <sub>4</sub> S <sub>2</sub>
Molecular Weight	174.1

### 10. Stability and reactivity

<b>Reactive Hazard</b>	Yes
<b>Stability</b>	Stable under normal conditions. Moisture sensitive. Strong reducing agent. Fire and explosion risk in contact with oxidizing agents.
<b>Conditions to Avoid</b>	Incompatible products. Excess heat. Avoid dust formation. Exposure to moist air or water.
<b>Incompatible Materials</b>	Acids, Oxidizing agents
<b>Hazardous Decomposition Products</b>	Sulfur oxides
<b>Hazardous Polymerization</b>	Hazardous polymerization does not occur.
<b>Hazardous Reactions</b>	None under normal processing.

### 11. Toxicological information

#### Acute Toxicity

#### Product Information

#### Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium dithionite	LD50 = 2500 mg/kg ( Rat )	>2 g/kg ( Rat)	>5.5 mg/L/4h ( Rat )

**Toxicologically Synergistic Products** No information available

#### Delayed and immediate effects as well as chronic effects from short and long-term exposure

<b>Irritation</b>	Irritating to eyes
<b>Sensitization</b>	No information available



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

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Sodium dithionite	7775-14-6	Not listed	Not listed	Not listed	Not listed	Not listed

**Mutagenic Effects** No information available

**Reproductive Effects** No information available.

**Developmental Effects** No information available.

**Teratogenicity** No information available.

**STOT - single exposure** None known

**STOT - repeated exposure** None known

**Aspiration hazard** No information available

**Symptoms / effects, both acute and delayed** No information available

**Endocrine Disruptor Information** No information available

**Other Adverse Effects** The toxicological properties have not been fully investigated.

## 12. Ecological information

### Ecotoxicity

Do not empty into drains. The product contains following substances which are hazardous for the environment. Harmful to aquatic organisms. Contains a substance which is:

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Sodium dithionite	EC50: = 87 mg/L, 96h (Desmodesmus subspicatus) EC50: = 120 mg/L, 72h (Desmodesmus subspicatus)	LC50: 46 - 68 mg/L, 96h static (Leuciscus idus)	EC50 = 107 mg/L 17 h	EC50: = 98 mg/L, 48h (Daphnia magna Straus)

**Persistence and Degradability** Persistence is unlikely

**Bioaccumulation/ Accumulation** No information available.

**Mobility** Will likely be mobile in the environment due to its water solubility.

Component	log Pow
Sodium dithionite	-4.7

## 13. Disposal considerations

**Waste Disposal Methods** Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

## 14. Transport information

### DOT

UN-No UN1384  
 Proper Shipping Name SODIUM DITHIONITE  
 Hazard Class 4.2  
 Packing Group II

### TDG

**Sodium hydrosulfite**

Revision Date 04-Jun-2019

**UN-No** UN1384  
**Proper Shipping Name** SODIUM DITHIONITE  
**Hazard Class** 4.2  
**Packing Group** II  
**IATA**  
**UN-No** UN1384  
**Proper Shipping Name** Sodium dithionite  
**Hazard Class** 4.2  
**Packing Group** II  
**IMDG/MO**  
**UN-No** UN1384  
**Proper Shipping Name** Sodium dithionite (Sodium hydrosulphite)  
**Hazard Class** 4.2  
**Packing Group** II

**15. Regulatory information**

**United States of America Inventory**

Component	CAS-No	TSCA	TSCA Inventory notification - Active/Inactive	TSCA - EPA Regulatory Flags
Sodium dithionite	7775-14-6	X	ACTIVE	-

**Legend:**  
**TSCA** - Toxic Substances Control Act, (40 CFR Part 710)  
 X - Listed  
 '-' - Not Listed

**TSCA 12(b)** - Notices of Export Not applicable

**International Inventories**

X = listed.

Component	CAS-No	DSL	NDSL	EINECS	PICCS	ENCS	AICS	IECSC	KECL
Sodium dithionite	7775-14-6	X	-	231-890-0	X	X	X	X	KE-31508

**U.S. Federal Regulations**

**SARA 313** Not applicable  
**SARA 311/312 Hazard Categories** See section 2 for more information  
**CWA (Clean Water Act)** Not applicable  
**Clean Air Act** Not applicable  
**OSHA - Occupational Safety and Health Administration** Not applicable  
**CERCLA** Not applicable  
**California Proposition 65** This product does not contain any Proposition 65 chemicals

**U.S. State Right-to-Know Regulations**

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Sodium dithionite	X	X	X	-	X

**U.S. Department of Transportation**  
 Reportable Quantity (RQ): N

**Sodium hydrosulfite**

Revision Date 04-Jun-2019

DOT Marine Pollutant N  
DOT Severe Marine Pollutant N

**U.S. Department of Homeland Security**

This product contains the following DHS chemicals:  
**Legend** - STQs = Screening Threshold Quantities, APA = A placarded amount

Component	DHS Chemical Facility Anti-Terrorism Standard
Sodium dithionite	APA

**Other International Regulations**

Mexico - Grade No information available

**16. Other information**

**Prepared By** Regulatory Affairs  
Thermo Fisher Scientific  
Email: EMSDS.RA@thermofisher.com

**Creation Date** 27-Nov-2010  
**Revision Date** 04-Jun-2019  
**Print Date** 04-Jun-2019

**Revision Summary** This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

**Disclaimer**

The information provided in this Safety Data Sheet 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 guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered 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 materials or in any process, unless specified in the text

**End of SDS**