### Material Safety Data Sheet
**Differentiating Solution**

#### Section 1 - Chemical Product and Company Identification

**MSDS Name:**
Differentiating Solution

**Catalog Numbers:**
74204, 74204E, 74211, 88117

**Synonyms:**
None Known.

**Company Identification:**
Richard Allan Scientific
4481 Campus Drive
Kalamazoo, MI 49008

**Company Phone Number:**
800-522-7270

**Emergency Phone Number:**
800-424-9300

**CHEMTREC Phone Number, US:**
(800) 424-9300

**CHEMTREC Phone Number, Europe:**
(202) 483-7616

#### Section 2 - Composition, Information on Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
<th>Percent</th>
<th>EINECS/ELINCS</th>
<th>Hazard Symbols</th>
<th>Risk Phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>64-17-5</td>
<td>Ethyl alcohol</td>
<td>60-63</td>
<td>200-578-6</td>
<td>F</td>
<td>11</td>
</tr>
<tr>
<td>67-63-0</td>
<td>Isopropyl alcohol</td>
<td>3.0-3.5</td>
<td>200-661-7</td>
<td>F XI</td>
<td>11 36 67</td>
</tr>
<tr>
<td>67-56-1</td>
<td>Methyl alcohol</td>
<td>3.0-3.5</td>
<td>200-659-6</td>
<td>F T</td>
<td>11 23/24/25</td>
</tr>
<tr>
<td></td>
<td>Hydrogen chloride</td>
<td>0-1.5</td>
<td>231-595-7</td>
<td>C</td>
<td>34 37</td>
</tr>
</tbody>
</table>
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Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: Water-white liquid
Warning! Causes severe eye irritation. Flammable liquid and vapor. Causes respiratory tract irritation. Harmful if swallowed, inhaled, or absorbed through the skin. This substance has caused adverse reproductive and fetal effects in humans. May cause central nervous system depression. May cause liver, kidney and heart damage. Causes moderate skin irritation. Flash Point: 21.1°C.
Target Organs: Kidneys, Heart, Central nervous system, Liver, Eyes

Potential Health Effects

Eye:
Causes severe eye irritation. May cause painful sensitization to light. May cause permanent visual impairment. May cause chemical conjunctivitis and corneal damage.

Skin:
Causes moderate skin irritation. May cause cyanosis of the extremities. Methanol can be absorbed through the skin, producing systemic effects that include visual disturbances.

Ingestion:
Harmful if swallowed. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause systemic toxicity with acidosis. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure.

Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause narcotic effects in high concentration. Vapors may cause dizziness or suffocation.

Chronic:
May cause reproductive and fetal effects. Laboratory experiments have resulted in mutagenic effects. Animal studies have reported the development of tumors. Prolonged exposure may cause liver, kidney, and heart damage.

Section 4 - First Aid Measures

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

Skin:
Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Ingestion:
Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation:
Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Notes to Physician:
Treat symptomatically and supportively. Persons with skin or eye disorders or liver, kidney, chronic respiratory diseases, or central and peripheral nervous system diseases may be at increased risk from exposure to this substance.

Antidote:
Replace fluid and electrolytes.

Section 5 - Fire Fighting Measures

General Information:
Replace fluid and electrolytes. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures above the flashpoint. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire.

Extinguishing Media:
For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water.

Autoignition Temperature:
Not available

Explosion Limits:
Lower: 3.3 Upper: 19.0

Flash Point:
21.1°C (69.98°F)

NFPA Rating:
(estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information:
Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.
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Section 7 - Handling and Storage

Handling:
Wash thoroughly after handling. Use only in a well-ventilated area. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Keep away from heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Storage:
Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area.
Do not store near perchlorates, peroxides, chromic acid or nitric acid.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls:
Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl alcohol</td>
<td>1000 ppm TWA</td>
<td>1000 ppm TWA; 1900 mg/m3 TWA; 3300 ppm IDLH (10% LEL)</td>
<td>1000 ppm TWA; 1900 mg/m3 TWA;</td>
</tr>
<tr>
<td>Isopropyl alcohol</td>
<td>200 ppm TWA; 400 ppm STEL</td>
<td>400 ppm TWA; 980 mg/m3 TWA; 2000 ppm IDLH (10% LEL)</td>
<td>400 ppm TWA; 980 mg/m3 TWA;</td>
</tr>
<tr>
<td>Methyl alcohol</td>
<td>200 ppm TWA; 250 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous route</td>
<td>200 ppm TWA; 260 mg/m3 TWA; 6000 ppm IDLH</td>
<td>200 ppm TWA; 260 mg/m3 TWA;</td>
</tr>
<tr>
<td>Hydrogen chloride</td>
<td>2 ppm Ceiling</td>
<td>50 ppm IDLH 5 ppm Ceiling; 7 mg/m3 Ceiling</td>
<td>5 ppm Ceiling; 7 mg/m3 Ceiling</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs
Ethyl alcohol: 1000 ppm TWA; 1900 mg/m3 TWA
Isopropyl alcohol: 400 ppm TWA; 980 mg/m3 TWA
Methyl alcohol: 200 ppm TWA; 260 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear chemical splash goggles and face shield.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.
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Respirators:
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.

Section 9 - Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>Liquid</td>
</tr>
<tr>
<td>Color</td>
<td>Water-white</td>
</tr>
<tr>
<td>Odor</td>
<td>Alcohol-like</td>
</tr>
<tr>
<td>pH</td>
<td>No information found</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>36 mm Hg</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>1.2 (Air=1)</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>1.7 (Butyl acetate =1)</td>
</tr>
<tr>
<td>Viscosity</td>
<td>No information found</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>76.1-89.4°C</td>
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<tr>
<td>Freezing/Melting Point</td>
<td>No information found</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>No information found</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>Soluble.</td>
</tr>
<tr>
<td>Specific Gravity/Density</td>
<td>0.887 @ 21°C</td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>Solution</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>No information found</td>
</tr>
</tbody>
</table>

Section 10 - Stability and Reactivity

Chemical Stability:
Stable under normal temperatures and pressures.

Conditions to Avoid:
Incompatible materials, ignition sources, excess heat, oxidizers

Incompatibilities with Other Materials
Strong oxidizing agents, acids, alkali metals, ammonia, hydrazine, peroxides, sodium, acid anhydrides, calcium hypochlorite, chromyl chloride, nitrosyl perchlorate, bromine pentafluoride, perchloric acid, silver nitrate, mercuric nitrate, potassium tert-butoxide, magnesium perchlorate, acid chlorides, platinum, uranium hexafluoride, silver oxide, iodine heptafluoride, acetyl bromide, disulfuryl difluoride, tetrachlorosilane + water, acetyl chloride, permanganic acid, ruthenium (VIII) oxide, uranyl perchlorate, potassium dioxide

Hazardous Decomposition Products
Carbon monoxide, carbon dioxide

Hazardous Polymerization
Has not been reported

Section 11 - Toxicological Information

RTECS:
CAS# 64-17-5: KQ6300000
CAS# 67-63-0: NT8050000
CAS# 67-56-1: PC1400000
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CAS# 7647-01-0: MW4025000: MW4031000

LD50/LC50:

CAS# 64-17-5:
- Draize test, rabbit, eye: 500 mg Severe
- Draize test, rabbit, eye: 500 mg/24H Mild
- Draize test, rabbit, skin: 20 mg/24H Moderate
- Inhalation, mouse: LC50 = 39 gm/m3/4H
- Inhalation, rat: LC50 = 20000 ppm/10H
- Oral, mouse: LD50 = 3450 mg/kg
- Oral, rabbit: LD50 = 6300 mg/kg
- Oral, rat: LD50 = 7060 mg/kg
- Oral, rat: LD50 = 9000 mg/kg.

CAS# 67-63-0:
- Draize test, rabbit, eye: 100 mg Severe
- Draize test, rabbit, eye: 10 mg Moderate
- Draize test, rabbit, skin: 500 mg Mild
- Inhalation, mouse: LC50 = 53000 mg/m3
- Inhalation, rat: LC50 = 16000 ppm/8H
- Inhalation, rat: LC50 = 72600 mg/m3
- Oral, mouse: LD50 = 3600 mg/kg
- Oral, mouse: LD50 = 3600 mg/kg
- Oral, rabbit: LD50 = 6410 mg/kg
- Oral, rat: LD50 = 5045 mg/kg
- Oral, rat: LD50 = 5000 mg/kg
- Skin, rabbit: LD50 = 12800 mg/kg.

CAS# 67-56-1:
- Draize test, rabbit, eye: 40 mg Moderate
- Draize test, rabbit, eye: 100 mg/24H Moderate
- Draize test, rabbit, skin: 20 mg/24H Moderate
- Inhalation, rabbit: LC50 = 81000 mg/m3/14H
- Inhalation, rat: LC50 = 64000 ppm/4H
- Oral, mouse: LD50 = 7300 mg/kg
- Oral, rabbit: LD50 = 14200 mg/kg
- Oral, rat: LD50 = 5600 mg/kg
- Skin, rabbit: LD50 = 15800 mg/kg.

CAS# 7647-01-0:
- Inhalation, mouse: LC50 = 1108 ppm/1H
- Inhalation, mouse: LC50 = 20487 mg/m3/5M
- Inhalation, mouse: LC50 = 3940 mg/m3/30M
- Inhalation, mouse: LC50 = 8300 mg/m3/30M
- Inhalation, rat: LC50 = 3124 ppm/1H
- Inhalation, rat: LC50 = 60938 mg/m3/5M
- Inhalation, rat: LC50 = 7004 mg/m3/30M
- Inhalation, rat: LC50 = 45000 mg/m3/30M
- Inhalation, rat: LC50 = 8300 mg/m3/30M
- Oral, rabbit: LD50 = 900 mg/kg.

Carcinogenicity:

CAS# 64-17-5
ACGIH: Not listed
California: Not listed
NTP: Not listed
IARC: Group 1 carcinogen
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CAS# 67-63-0: Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 67-56-1: Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 7647-01-0: Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology:
Ethanol has been shown to produce fetotoxicity in the embryo or fetus of laboratory animals. Prenatal exposure to ethanol is associated with a distinct pattern of congenital malformations that have collectively been termed the "fetal alcohol syndrome". Methanol has been shown to produce fetotoxicity in the embryo or fetus of laboratory animals. Specific developmental abnormalities include cardiovascular, musculoskeletal, and urogenital systems.

Teratogenicity:
There is no human information available. Methanol is considered to be a potential developmental hazard based on animal data. In animal experiments, methanol has caused fetotoxic or teratogenic effects without maternal toxicity.

Reproductive:
Intrauterine, Human - woman: TDLo = 200 mg/kg (female 5 day(s) pre-mating) Fertility - female fertility index (e.g. # females pregnant per # sperm positive females; # females pregnant per # females mated).

Mutagenicity:

Neurotoxicity:
No information found

Other:
See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity:
Fish: Rainbow trout: LC50 = 12900-15300 mg/L; 96 Hr; Flow-through @ 24-24.3°C
Fish: Rainbow trout: LC50 = 11200 mg/L; 24 Hr; Fingerling (Unspecified)
Bacteria: Phytobacterium phosphoreum: EC50 = 34900 mg/L; 5-30 min; Microtox test

When spilled on land it is apt to volatilize, biodegrade, and leach into the ground water, but no data on the rates of these processes could be found. Its fate in ground water is unknown. When released into water it will volatilize and probably biodegrade. It would not be expected to adsorb to sediment or bioconcentrate in fish.

Environmental:
When released to the atmosphere it will photodegrade in hours (polluted urban atmosphere) to an estimated range of 4 to 6 days in less polluted areas. Rainout should be significant.

Physical:
No information found

Other:
No information found
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Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Part 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P Series Wastes
None of the components are on this list.

RCRA U Series Wastes
CAS# 67-56-1: waste number U154 (Ignitable waste).

Section 14 - Transport Information

US DOT

Proper Shipping Name: Flammable Liquids, Corrosive N.O.S., (Ethanol, Hydrochloric Acid)
Hazard Class: 3 (8)
UN Number: UUN2924
Packing Group: II

USA RQ: CAS# 67-56-1: 5000 lb final RQ; 2270 kg final RQ
USA RQ: CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ

Canadian TDG

Flammable Liquids, Corrosive N.O.S., Ethano, Hydrochloric Acid
3 (8)
UUN2924
II

Section 15 - Regulatory Information

US Federal

TSCA
CAS# 64-17-5 is listed on the TSCA Inventory.
CAS# 67-63-0 is listed on the TSCA Inventory.
CAS# 67-56-1 is listed on the TSCA Inventory.
CAS# 7647-01-0 is listed on the TSCA Inventory.

Health and Safety Reporting List
CAS# 67-63-0: Effective 12/15/86, Sunset 12/15/96

Chemical Test Rules
CAS# 67-63-0: 40 CFR 799.2325

TSCA Section 12b
None of the components are on this list.

TSCA Significant New Use Rule (SNUR)
None of the components are on this list.
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CERCLA Hazardous Substances and corresponding RQs
- CAS# 67-56-1: 5000 lb final RQ; 2270 kg final RQ
- CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances
- CAS# 7647-01-0: 500 lb TPQ (gas only)

SARA Hazard Categories
- CAS# 64-17-5: immediate, delayed, fire.
- CAS# 67-63-0: immediate, delayed, fire.
- CAS# 67-56-1: immediate, fire.
- CAS# 7647-01-0: immediate.

SARA Section 313
This material contains Isopropyl alcohol (CAS# 67-63-0, 3.0-3.5%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
This material contains Methyl alcohol (CAS# 67-56-1, 3.0-3.5%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
This material contains Hydrogen chloride (CAS# 7647-01-0, 0-1.5%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.

Clean Air Act - Hazardous Air Pollutants (HAPs)
- CAS# 67-56-1 is listed as a hazardous air pollutant (HAP).
- CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP).

Clean Air Act - Class 1 Ozone Depleters
None of the components are on this list.

Clean Air Act - Class 2 Ozone Depleters
None of the components are on this list.

Clean Water Act - Hazardous Substances
- CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA.

Clean Water Act - Priority Pollutants
None of the components are on this list.

Clean Water Act - Toxic Pollutants
None of the components are on this list.

OSHA - Highly Hazardous
- CAS# 7647-01-0 is considered highly hazardous by OSHA.

OSHA - Specifically Regulated Chemicals
None of the components are on this list.

US State

State Right to Know
Ethyl alcohol can be found on the following state Right-to-Know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
Isopropyl alcohol can be found on the following state Right-to-Know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
Methyl alcohol can be found on the following state Right-to-Know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
Hydrogen chloride can be found on the following state Right-to-Know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65
None of the components are on this list.
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California No Significant Risk Level
None of the components are on this list.

European/International Regulations

European Labelling in Accordance with EC Directives:
Hazard Symbols: XN
Risk Phrases: R 10 Flammable.
R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
R 68/20/21/22 Harmful: possible risk of irreversible effects through inhalation, in contact with skin and if swallowed.
Safety Phrases: S 7 Keep container tightly closed.
S 9 Keep container in a well-ventilated place.
S 16 Keep away from sources of ignition - No smoking.
S 33 Take precautionary measures against static discharges.
S 36/37 Wear suitable protective clothing and gloves.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
No information found

United Kingdom Occupational Exposure Limits
No information found

United Kingdom Maximum Exposure Limits
No information found

Canadian DSL/NDSL
CAS# 64-17-5 is listed on Canada's DSL List.
CAS# 67-63-0 is listed on Canada's DSL List.
CAS# 67-66-1 is listed on Canada's DSL List.
CAS# 7647-01-0 is listed on Canada's DSL List.

Canadian WHMIS Classifications
This product has a WHMIS classification of B2, D2A, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List
CAS# 64-17-5 is listed on the Canadian Ingredient Disclosure List.
CAS# 67-63-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 67-66-1 is listed on the Canadian Ingredient Disclosure List.
CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Other Information

No information found
MSDS Creation Date: July 20, 2005
Revision Date: April 30, 2008
This MSDS is intended for review and guidance in the receipt, storage, handling, use and disposal of product purchased from us, and for no other purpose. Use this product only as directed and in accordance with applicable instructions and warnings provided with the product. Please consult your institution’s policies regarding use of this product. If you have obtained this MSDS other than in connection with the supply of this product from us, this MSDS should be consulted for general information only, and should not be relied upon for any purpose. As with the use of all hazardous materials, you should in all instances follow the guidance of the MSDS provided or available with the specific product purchased.