Material Safety Data Sheet

Section 1. Product and Company Identification

Product Name: Iodine–Bromine Solution, Hanus

Product Code: VW6261

Manufacturer: EMD Chemicals Inc.
P.O. Box 70
480 Democrat Road
Gibbstown, NJ 08027
Prior to January 1, 2003 EMD Chemicals Inc. was EM Industries, Inc. or EM Science, Division of EM Industries, Inc.

Effective Date: 3/4/2003

For More Information Call:
856–423–6300 Technical Service
Monday–Friday: 8:00 AM – 5:00 PM

In Case of Emergency Call:
800–424–9300 CHEMTREC
613–996–6666 CANUTEC
24 Hours/Day: 7 Days/Week

Synonym: None.

Material Uses: Laboratory Reagent

Chemical Family: Acetic Acid Solution

Section 2. Composition and Information on Ingredients

Component | CAS # | % by Weight
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ACETIC ACID | 64–19–7 | 97.8
IODINE | 7553–56–2 | 1.3
BROMINE | 7726–95–6 | 0.9

Section 3. Hazards Identification

Physical State and Appearance: Liquid.

Emergency Overview:
DANGER!
CAUSES SEVERE EYE AND SKIN BURNS.
HARMFUL IF INHALED, ABSORBED THROUGH SKIN OR SWALLOWED.
CAUSES RESPIRATORY TRACT IRRITATION.
CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS: LUNGS, MUCOUS MEMBRANES, RESPIRATORY TRACT, SKIN, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA, TEETH.
FLAMMABLE LIQUID AND VAPOR.
VAPOR MAY CAUSE FLASH FIRE.

Routes of Entry:
Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Potential Acute Health Effects:

**Eyes**: Extremely hazardous in case of eye contact (corrosive). Causes severe eye burns.

**Skin**: Extremely hazardous in case of skin contact (corrosive). Skin contact
Iodine–Bromine Solution, Hanus

produces severe burns. Hazardous in case of skin contact (permeator).

**Inhalation** Hazardous in case of inhalation (lung irritant).

**Ingestion** Hazardous in case of ingestion.

**Potential Chronic Health Effects**

- **Carcinogenic** This material is not known to cause cancer in animals or humans.

**Medical Conditions Aggravated by Overexposure:**

Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

**Section 4. First Aid Measures**

**Eye Contact**
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

**Skin Contact**
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

**Inhalation**
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**Ingestion**
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

**Section 5. Fire Fighting Measures**

**Flammability of the Product**
Product will burn.

**Auto–ignition Temperature**
The lowest known value is 425.9 to 462.9°C (798.6 to 865.2°F) (ACETIC ACID).

**Flash Points**
The lowest known value is Closed cup: 39.9°C (103.8°F). (ACETIC ACID)

**Flammable Limits**
Not available.

**Products of Combustion**
These products are carbon oxides (CO, CO2), halogenated compounds.

**Fire Hazards in Presence of Various Substances**
Not available.

**Explosion Hazards in Presence of Various Substances**
Risks of explosion of the product in presence of static discharge: No.

Risks of explosion of the product in presence of mechanical impact: No.

**Fire Fighting Media and Instructions**
Flammable liquid, soluble or dispersed in water.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build–up, autoignition
or explosion.

**Protective Clothing**  
Be sure to use an approved/certified respirator or equivalent.

(Fire)  

**Special Remarks on Fire Hazards**  
Not available.

**Fire Hazards**  
Special Remarks on Not available.

**Explosion Hazards**

+ **Section 6. Accidental Release Measures**

**Small Spill and Leak**  
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: **Neutralize the residue with a dilute solution of sodium carbonate.**

**Large Spill and Leak**  
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non–combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. **Neutralize the residue with a dilute solution of sodium carbonate.** Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

**Spill Kit Information**  
The following EM SCIENCE SpillSolv (TM) absorbent is recommended for this product:  
SX1310 Acid Treatment Kit

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**Section 7. Handling and Storage**

**Handling**  
Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion–proof electrical (ventilating, lighting and material handling) equipment.

**Storage**  
Store in a segregated and approved area. Keep container in a cool, well–ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

+ **Section 8. Exposure Controls/Personal Protection**

**Engineering Controls**  
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work–station location.

**Personal Protection**

**Eyes**  
Face shield.

**Body**  
Full suit.

**Respiratory**  
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

**Hands**  
Gloves.

**Feet**  
Boots.

**Protective Clothing**

(Pictograms)

**Personal Protection**  
in Case of a Large Spill

self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Exposure Limits</th>
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<tbody>
<tr>
<td>ACETIC ACID</td>
<td>AUVA (Austria, 1995). PEAK: 50 mg/m3 8 times per shift, Period: 5 minute(s). PEAK: 20 ppm 8 times per shift, Period: 5 minute(s). MAK: 25 mg/m3 MAK: 10 ppm.</td>
</tr>
</tbody>
</table>
Iodine–Bromine Solution, Hanus

STEL: 37 mg/m³
STEL: 15 ppm
MEL: 25 mg/m³
MEL: 10 ppm
ACGIH (United States, 1994).
STEL: 37 mg/m³
STEL: 15 ppm
TWA: 25 mg/m³
TWA: 10 ppm
NIOSH REL (United States, 1994).
STEL: 37 mg/m³
STEL: 15 ppm
TWA: 25 mg/m³ Period: 10 hour(s).
TWA: 10 ppm Period: 10 hour(s).
OSHA Final Rule (United States, 1989).
TWA: 25 mg/m³
TWA: 10 ppm

IODINE

ACGIH (United States, 1994).
CEIL: 1 mg/m³
OSHA (United States, 1989).
CEIL: 1 mg/m³
BAUA (Germany, 1997). Skin
MAK: 1 mg/m³
Spitzenbegrenzung: 1 mg/m³
Arbeidsinspectie (Netherlands, 1999).
TGG 8 uur: 1 mg/m³
MAC–C: 1 mg/m³
DK–Arbejdstylinet (Denmark, 1996).
GV: 1 mg/m³
Loftvaerdi: 1 mg/m³
INRS (France, 1996).
VLE: 1 mg/m³
VLE: 0.1 ppm
National Authority for Occupational Safety/Health
(Ireland, 1999).
STEL: 1 mg/m³
STEL: 0.1 ppm
EH40–OES (United Kingdom (UK), 1997).
STEL: 1.1 mg/m³
STEL: 0.1 ppm
ACGIH (United States, 1994).
CEIL: 1 mg/m³
CEIL: 0.1 ppm
NIOSH REL (United States, 1994).
CEIL: 1 mg/m³
CEIL: 0.1 ppm
OSHA Final Rule (United States, 1989).
CEIL: 1 mg/m³
CEIL: 0.1 ppm

BROMINE

BAUA (Germany, 1997).
PEAK: 0.7 mg/m³
PEAK: 0.1 ppm
MAK: 0.7 mg/m³
MAK: 0.1 ppm
DK–Arbejdstyldin (Denmark, 1996).
GV: 0.7 mg/m³
GV: 0.1 ppm
TWA: 0.1 mg/m³
TWA: 0.7 ppm
INRS (France, 1996).
VLE: 0.7 mg/m³
VLE: 0.1 ppm
National Authority for Occupational Safety/Health (Ireland, 1999).
 STEL: 2 mg/m³
 STEL: 0.3 ppm
 OEL: 0.7 mg/m³
 OEL: 0.1 ppm
EH40–OES (United Kingdom (UK), 1997).
 STEL: 2 mg/m³
 STEL: 0.3 ppm
 MEL: 0.66 mg/m³
 MEL: 0.1 ppm
ACGIH (United States, 1994).
 STEL: 1.3 mg/m³
 STEL: 0.2 ppm
 TWA: 0.66 mg/m³
 TWA: 0.1 ppm
NIOSH REL (United States, 1994).
 STEL: 2 mg/m³
 STEL: 0.3 ppm
 TWA: 0.7 mg/m³ Period: 10 hour(s).
 TWA: 0.1 ppm Period: 10 hour(s).
OSHA Final Rule (United States, 1989).
 STEL: 2 mg/m³
 STEL: 0.3 ppm
 TWA: 0.7 mg/m³
 TWA: 0.1 ppm

Section 9. Physical and Chemical Properties
Odor Vinegar–like
Color Red–brown
Physical State and Appearance Liquid.
Molecular Weight Not applicable.
Molecular Formula Not applicable.
pH Acidic.
Boiling/Condensation Point The lowest known value is 117.83°C (244.1°F) (ACETIC ACID).
Melting/Freezing Point May start to solidify at 16.72°C (62.1°F) based on data for: ACETIC ACID.
Iodine–Bromine Solution, Hanus

**Specific Gravity**  
Weighted average: 1.06 (Water = 1)

**Vapor Pressure**  
Not available.

**Vapor Density**  
The highest known value is 2.1 (Air = 1) (ACETIC ACID).

**Odor Threshold**  
Not available.

**Evaporation Rate**  
1.34 (ACETIC ACID) compared to (n–BUTYL ACETATE=1)

**LogKow**  
Not available.

**Solubility**  
Soluble in water.

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**Section 10. Stability and Reactivity**

**Stability and Reactivity**  
The product is stable.

**Conditions of Instability**  
Not available.

**Incompatibility with Various Substances**  
Highly reactive with reducing agents, organic materials, metals, alkalis. Slightly reactive to reactive with combustible materials, acids.

**Rem/Incompatibility**  
Incompatible with amines, strong bases, chromic acid, acetaldehyde, alluninm, titatium, mercury, potassium, alkaloids, starch, tannins, ammonia, phosphorus/ethanol mixture, pyridine, and acetylene.

**Hazardous Decomposition Products**  
COx , bromine compounds , Iodine

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**Section 11. Toxicological Information**

**RTECS Number:**
- Acetic Acid  
  AF1225000
- Iodine  
  NN1575000
- Bromine  
  EF9100000

**Toxicity**  
Acute oral toxicity (LD50): 3310 mg/kg [Rat]. (ACETIC ACID).

**Chronic Effects on Humans**  
Not available.

**Acute Effects on Humans**  

**Synergetic Products (Toxicologically)**  
Not available.

**Irritancy**  
Draize Test: Not available.

**Sensitization**  
Slightly hazardous in case of inhalation (lung sensitizer).

**Carcinogenic Effects**  
This material is not known to cause cancer in animals or humans.

**Toxicity to Reproductive System**  
Not available.

**Teratogenic Effects**  
Not available.

**Mutagenic Effects**  
Not available.
Section 12. Ecological Information

Ecotoxicity: Not available.
BOD5 and COD: Not available.
Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Section 13. Disposal Considerations

EPA Waste Number: Not available.
Treatment: Not available.

Section 14. Transport Information

DOT Classification: Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, ORGANIC,N.O.S.(ACETIC ACID)
Hazard Class: 8
UN number: UN3265
Packing Group: II
RQ: Not applicable.

TDG Classification: Not available.

IMO/IMDG Classification: Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, ORGANIC,N.O.S.(ACETIC ACID)
Hazard Class: 8
UN number: UN3265
Packing Group: II
RQ: Not applicable.

ICAO/IATA Classification: Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, ORGANIC,N.O.S.(ACETIC ACID)
Hazard Class: 8
UN number: UN3265
Packing Group: II
RQ: Not applicable.

Section 15. Regulatory Information

U.S. Federal Regulations: TSCA 8(b) inventory: ACETIC ACID; IODINE; BROMINE
SARA 302/304/311/312 extremely hazardous substances: BROMINE
SARA 302/304 emergency planning and notification: BROMINE
SARA 302/304/311/312 hazardous chemicals: ACETIC ACID; IODINE; BROMINE
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: ACETIC ACID
Iodine–Bromine Solution, Hanus

Clean air act (CAA) 112 accidental release prevention: BROMINE
Clean air act (CAA) 112 regulated flammable substances: No products were found.
Clean air act (CAA) 112 regulated toxic substances: BROMINE

**WHMIS (Canada)**

CLASS B–3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
CLASS E: Corrosive liquid.
CEPA DSL: ACETIC ACID; IODINE; BROMINE
This product has been classified in accordance with the hazard criteria of the Controlled Product Regulations and the MSDS contains all required information.

**International Regulations**

**EINECS**

<table>
<thead>
<tr>
<th>ACETIC ACID 200–580–7</th>
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<tr>
<td>IODINE 231–442–4</td>
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<td>BROMINE 231–778–1</td>
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**DSCL (EEC)**

R20– Harmful by inhalation.
R35– Causes severe burns.

**International Lists**

Australia (NICNAS): ACETIC ACID; IODINE; BROMINE
Japan (MITI): ACETIC ACID
Korea (TCCL): ACETIC ACID; IODINE; BROMINE
Philippines (RA6969): ACETIC ACID; IODINE; BROMINE
China: No products were found.

**State Regulations**

Pennsylvania RTK: ACETIC ACID: (environmental hazard, generic environmental hazard); IODINE: (generic environmental hazard); BROMINE: (environmental hazard, generic environmental hazard)
Massachusetts RTK: ACETIC ACID; IODINE; BROMINE
New Jersey: Iodine–Bromine Solution, Hanus
California prop. 65: No products were found.

**Section 16. Other Information**

<table>
<thead>
<tr>
<th>National Fire Protection Association (U.S.A.)</th>
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**Fire Hazard**

**Reactivity**

**Specific Hazard**

Changed Since Last Revision +

**Notice to Reader**

The statements contained herein are based upon technical data that EMD Chemicals Inc. believes to be reliable, are offered for information purposes only and as a guide to the appropriate precautionary and emergency handling of the material by a properly trained person having the necessary technical skills. Users should consider these data only as a supplement to other information gathered by them and must make independent decisions.
determinations of suitability and completeness of information from all sources to assure proper use, storage and disposal of these materials and the safety and health of employees and customers and the protection of the environment. EMD CHEMICALS INC. MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, WITH RESPECT TO THE INFORMATION HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS.