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 (USA)
613–996–6666 CANUTEC (Canada)
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
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

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

Additional information See Toxicological Information (section 11)

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 (Fire) Be sure to use an approved/certified respirator or equivalent.

Special Remarks on Fire Hazards Not available.

Special Remarks on Explosion Hazards Not available.

+ 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

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 Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A

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.

Product Name	Exposure Limits
ACETIC ACID	**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 **Belgium Minister of Labour (Belgium, 1998).** VCD: 38 mg/m3 VCD: 15 ppm VL: 25 mg/m3 VL: 10 ppm **BAUA (Germany, 1997).** PEAK: 25 mg/m3 PEAK: 10 ppm MAK: 25 mg/m3 MAK: 10 ppm **DK–Arbejdstylsinet (Denmark, 1996).** GV: 25 mg/m3 GV: 10 ppm **80/1107/EEC (Europe, 1991).** TWA: 10 mg/m3 TWA: 25 ppm **Tyterveyslaitos (Finland, 1998).** STEL: 37 mg/m3 STEL: 15 ppm TWA: 25 mg/m3 TWA: 10 ppm **INRS (France, 1996).** VLE: 25 mg/m3 VLE: 10 ppm **National Authority for Occupational Safety/Health (Ireland, 1999).** STEL: 37 mg/m3 STEL: 15 ppm OEL: 25 mg/m3 OEL: 10 ppm **Arbeidsinspectie (Netherlands, 1999).** TGG 8 uur: 25 mg/m3 TGG 8 uur: 10 ppm **N–Arbeidstylsinet (Norway, 1996).** AN: 25 mg/m3 AN: 10 ppm **AFS (Sweden, 1996).** KTV: 25 mg/m3 KTV: 10 ppm NGV: 13 mg/m3 NGV: 5 ppm **EH40–OES (United Kingdom (UK), 1997).**

	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–Arbejdstylsinet (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–Arbejdstylsinet (Denmark, 1996).
GV: 0.7 mg/m3
GV: 0.1 ppm
80/1107/EEC (Europe, 1991).
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.

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.

+ 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
Hazardous Polymerization	Not available.

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	Extremely hazardous in case of eye contact (corrosive). Causes severe eye burns. Extremely hazardous in case of skin contact (corrosive). Skin contact produces severe burns. Hazardous in case of skin contact (permeator). Hazardous in case of inhalation (lung irritant). Hazardous in case of ingestion.
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
SARA 311/312 MSDS distribution – chemical inventory – hazard identification: ACETIC ACID: Fire Hazard, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard; IODINE: Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard; BROMINE: Fire Hazard, reactive, Immediate (Acute) Health Hazard
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: ACETIC ACID

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 classiifed in accordance with the hazard criteria of the Controlled Product Regulations and the MSDS contains all required information.

International Regulations

EINECS ACETIC ACID 200–580–7
IODINE 231–442–4
BROMINE 231–778–1

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

National Fire Protection Association (U.S.A.)

Health 3

Fire Hazard 2

Reactivity 1

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

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.