

MATERIAL SAFETY DATA SHEET

FILE NO.:MSDS-201072 Ver. 1.0

MSDS DATE: 09/20/2011

E-Pure CyTOF Tuning Solution



SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: E-Pure CyTOF™ Tuning Solution, 250 mL
SYNONYMS: Not applicable
PRODUCT CODES: 201072

MANUFACTURER: DVS Sciences Inc.
DIVISION:
ADDRESS: 70 Esna Park Drive, Unit 12
Markham, ON L3R 6E7

TECHNICAL PHONE: (905) 513-1704

PRODUCT USE: For tuning of the CyTOF Mass Cytometer.

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

DESCRIPTION: Mixture of the substances listed below with non-hazardous additions.

<u>PRODUCT NAME</u>	<u>CAS NO.</u>	<u>%WT</u>	<u>%VOL.</u>
E-Pure CyTOF Tuning Solution	None	N/A	N/A

DANGEROUS COMPONENTS

Nitric Acid	7697-37-2		2
*Cesium Nitrate	7789-18-6	0.5	0.05
*Hydrogen Chloride	7647-01-0		<0.1

CHEMICAL IDENTIFICATION OF THE SUBSTANCE/PREPARATION

Deionized Water (Gradient, >18MΩ)	7732-18-5		~97
Iridium Chloride	12645-45-3	0.25	0.025
Lanthanum Oxide	1312-81-8	0.5	0.05
Terbium Oxide	7440-27-9	0.5	0.05
Thulium Oxide	12036-44-1	0.5	0.05

SECTION 2 NOTES:

*Cesium Nitrate and Hydrogen Chloride are both present in the mixture at <1%. According to 29CFR1910.1200(d) ingredients at less than 1% concentration are not considered hazardous.

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

During a fire, nitric acid decomposes with the release of corrosive nitrogen oxide gases. STRONG OXIDIZER. Contact with combustible and easily oxidizable materials may result in fire and/or explosion. Highly reactive in large concentrations. May react violently or explosively and/or ignite spontaneously with many organic and inorganic chemicals. May release flammable hydrogen gas on contact with many metals, particularly in powdered form. Nitric acid poses a very serious inhalation hazard. Symptoms of exposure include dryness of the nose and throat, cough, chest pain, shortness of breath and difficulty breathing. Causes lung injury-effects may be delayed. CORROSIVE to the eyes, skin and respiratory tract. Causes severe burns. May cause permanent eye injury or blindness and permanent scarring.

POTENTIAL HEALTH EFFECTS:

Primary Route(s) of Entry: Skin contact. Eye contact. Inhalation and Ingestion.

Eyes: Causes severe eye burns and loss of vision. May cause permanent damage.

Skin: May cause skin irritation. Causes skin burns. May cause deep, penetrating ulcers of the skin.

Ingestion: Causes gastrointestinal tract burns. May cause perforation of the digestive tract. Burns in mouth, pharynx and gastrointestinal tract. Vomiting, nausea, diarrhea, abdominal pain, kidney damage and death.

Inhalation: May be fatal if inhaled. Effects may be delayed. May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Chemical pneumonitis, bronchitis, and possible death.

Acute Health Hazards: May be fatal by ingestion, inhalation of skin absorption. Corrosive. LDLo: ORAN-human 430 mg/kg.

LD50/LC50: CAS# 7697-37-2: Inhalation, rat: LC50=67 ppm (NO₂)/4H. CAS# 7732-18-5: Oral, rat: LD50= >90 mL/Kg. Inhalation, rate: LC50=1276 ppm/1H. CAS# 7647-01-0: Oral, rabbit: LD50=900mg/Kg. Inhalation, rate: rat, LC50= 3120ppm/1H. CAS# 7789-18-6: Oral, rat: LD50=2390mg/Kg.

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Chronic Health Hazards: Repeated inhalation may cause chronic bronchitis. Repeated exposure may cause erosion of teeth. May cause lesions of the skin, bronchial irritation, coughing, pneumonia and lung damage. To the best of our knowledge the chronic toxicity of this substance has not been fully investigated.

CARCINOGENICITY

OSHA: N/A ACGIH: N/A NTP: N/A IARC: N/A
OTHER: N/A

SECTION 3 NOTES:

There are no relevant human or animal studies to assess the carcinogenicity of nitric acid. The International Agency for Research on Cancer (IARC) has not evaluated the carcinogenicity of nitric acid.

SECTION 4: FIRST AID MEASURES

EYES: Flush eyes with plenty of water for at least 15 minutes, holding lids apart to ensure flushing of the entire surface. Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed.

SKIN: Get medical aid immediately. Immediately flush skin with copious quantities of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

INGESTION: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately. Call a physician. Never give anything by mouth to an unconscious person.

INHALATION: Remove patient from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. Call a physician.

NOTES TO PHYSICIANS OR FIRST AID PROVIDERS:

Treat symptomatically and supportively.

SECTION 5: FIRE-FIGHTING MEASURES

FLAMMABLE LIMITS IN AIR, UPPER: N/A
(% BY VOLUME) N/A LOWER: N/A

FLASH POINT: None

F: N/A

C: N/A

METHOD USED: N/A

AUTOIGNITION TEMPERATURE: N/A

F: N/A

C: N/A

NFPA HAZARD CLASSIFICATION

HEALTH: 4 **FLAMMABILITY:** 0 **REACTIVITY:** 0
OTHER: OXIDIZING MATERIAL

HMS HAZARD CLASSIFICATION

HEALTH: 3 **FLAMMABILITY:** 0 **REACTIVITY:** 0
PROTECTION: H

EXTINGUISHING MEDIA: Substance is non-combustible; use agent most appropriate to extinguish surrounding fire. Water spray.

SPECIAL FIREFIGHTING PROCEDURE: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Contact with combustible materials may cause a fire. Use water spray to keep fire-exposed containers cool. Substance is non-combustible.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Oxidizing material – contributes to combustion of other materials. Contact with other materials may cause fire and/or explosion. Nitric Acid reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

HAZARDOUS DECOMPOSITION PRODUCTS: When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate.

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. dry sand or earth), then place into a chemical waste container. Neutralize spill with sodium bicarbonate. A vapour suppressing foam may be used to reduce vapours.

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RELEASE MEASURES: Wear self-contained breathing apparatus, rubber boots and heavy rubber gloves. Add lime. Mix carefully with water to form a slurry. Place in a suitable container and send for disposal. Ventilate area and wash spill site after material pick-up is complete.

WASTE DISPOSAL METHOD: According to all applicable regulations. Avoid run-off.

SECTION 7: HANDLING AND STORAGE

HANDLING: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Do not get on skin or in eyes. Do not ingest or inhale. Do not allow smoking or food consumption while handling.

STORAGE: Store in a cool, dry well-ventilated area away from incompatible substances, heated areas, sparks and flame. Do not store in metal or glass containers. Do not store in direct sunlight. Do not store near organic substances. Keep tightly closed. Empty container may contain hazardous residue. Do not add any other material to the container. Do not wash down the drain. Do not get in eyes, on skin, or on clothing. Wash well after use. In accordance with good storage and handling practices.

OTHER PRECAUTIONS: Storage Code – White.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

VENTILATION: Use only in a chemical fume hood. Adequate ventilation to maintain vapour/dust below TLV.

RESPIRATORY PROTECTION: Wear appropriate OSHA/MSHA approved chemical cartridge respirator. Regulations found in 29 CFR 1910.134. If more than TLV, do not breathe in vapour. Wear self-contained breathing apparatus. Always use an NIOSH-approved respirator when necessary.

EYE PROTECTION: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133. Wear face shield.

SKIN PROTECTION: Wear appropriate protective neoprene gloves to prevent skin exposure. Wear acid-resistant PVC or neoprene jacket, trousers and boots sufficient to protect skin.

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Wear appropriate clothing to prevent skin exposure.

EXPOSURE LIMITS:

Chemical Name	OSHA	ACGIH
Nitric Acid	2 ppm TWA; 5 mg/m ³ TWA	2 ppm TWA; 5.2 mg/m ³ TWA; 4 ppm STEL; 10 mg/m ³ STEL
Hydrogen Chloride	5 ppm TWA; 7 mg/m ³ TWA	5 ppm TWA; 7.5 mg/m ³ TWA
Cesium Nitrate	Not available	Not available

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear, colorless

ODOR: Odorless

PHYSICAL STATE: Liquid

pH AS SUPPLIED: Not available

pH (Other): Not available

BOILING POINT:

F:

C: 100°C

MELTING POINT:

F:

C: 0°C

FREEZING POINT:

F:

C: 0°C

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VAPOR PRESSURE (mmHg): Not available

F:

C:

VAPOR DENSITY (AIR = 1): Not available

F:

C:

SPECIFIC GRAVITY (H₂O = 1): Not available

@

F:

C:

EVAPORATION RATE: Not available

BASIS (=1): Not available

SOLUBILITY IN WATER: Fully soluble

PERCENT SOLIDS BY WEIGHT: Not available

PERCENT VOLATILE: Not available

BY WT/ BY VOL @

F:

C:

VOLATILE ORGANIC COMPOUNDS (VOC): Not available

WITH WATER:	LBS/GAL
WITHOUT WATER:	LBS/GAL

MOLECULAR WEIGHT: Not available

VISCOSITY: Not available

@

F:

C:

SECTION 10: STABILITY AND REACTIVITY

STABILITY: Stable under normal temperatures and pressures.

CONDITIONS TO AVOID (STABILITY): High temperatures, incompatible materials, reducing agents.

INCOMPATIBILITY (MATERIAL TO AVOID): Reacts with over 150 chemical combinations. Refer to MFPA Fire Protection Guide for specifics. Reacts explosively with organic materials and combustibles. Reducing agents. Reacts with most common metals to produce hydrogen. Bases, alkalis, aluminum, cyanides, iron, copper, carbides, sulphides, alcohols, hydrogen sulphide, turpentine. Heat. Amines.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Nitrogen oxides.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID (POLYMERIZATION): Not applicable

REACTION PRODUCT(S): Toxic, corrosive fumes of nitrogen oxides.

SECTION 11: TOXICOLOGICAL INFORMATION

RTECS: CAS# 7697-37-2: QY5775000; QU5900000.

CAS# 7732-18-5: ZC0110000. CAS# 7647-01-0: MW4025000.

CAS# 7789-18-6: FL0700000.

LD50/LC50: See Section 3.

Carcinogenicity: CAS# 7697-37-2: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA or CA Prop 65. CAS# 7732-18-5: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA or CA Prop 65. CAS# 7647-01-0: Not listed as a carcinogen by ACGIH, NIOSH, NTP, OSHA or CA Prop 65. IARC: Group 3.

Epidemiology: No information available.

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Teratogenicity: CAS# 7697-37-2: Effects on newborn: biochemical and metabolic, Oral-rat TDLo=2345 mg/kg (female 18D post).
Fetotoxicity: Stunted fetus, Oral-rat TDLo=21150 mg/kg (female 1-21D post). CAS# 7647-01-0: Embryo or Fetus: Stunted fetus, ihl-rat TCLo =450 ml/m³/1H Specific Developmental Abnormalities: homeostasis, ihl-rat TCLo = 450 mg/m³/1H.

Reproductive: No information available.

Mutagenicity: No information available.

Neurotoxicity: No information available.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity: No information available. CAS# 7697-37-2: Mosquito fish: TLm=72/96H (fresh water). Cockle: LC50=330-1000ppm/49H (salt water). CAS# 7647-01-0: Trout LC100=10 mg/L/24H Shrimp LC50=100-330 ppm Starfish LC50=100-330 mg/L/48-96H Shore crab LC50=240 mg/L/48H Chronic plant toxicity=100 ppm.

Environmental: CAS# 7697-37-2: No information available. CAS# 7647-01-0: Substance will neutralize soil carbonate-based components.

Physical: No information available.

Other: None.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of in a manner consistent with federal, provincial/state/territorial, and local regulations.

RCRA HAZARD CLASS:

RCRA D-Maximum Concentration of Contaminants: None of the components are on this list.

RCRA D Series – Chronic Toxicity Reference Levels: None of the components are on this list.

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

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

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

RCRA Substances Banned from Land Disposal: None of the components are on this list.

SECTION 14: TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION

PROPER SHIPPING NAME: Corrosive liquid, acidic, inorganic, n.o.s. (Nitric Acid, Hydrochloric Acid)

HAZARD CLASS: 8

ID NUMBER: UN3264

PACKING GROUP: III

LABEL STATEMENTS: 8

MARITIME TRANSPORTATION IMDG

PROPER SHIPPING NAME: Corrosive liquid, acidic, inorganic, n.o.s. (Nitric Acid, Hydrochloric Acid)

IMDG CLASS: 8

UN NUMBER: 3264

PACKAGING GROUP: III

EMS NUMBER: F-A, S-B

MARITIME POLLUTANT: No

SEGREGATION GROUP: Acids

LABEL STATEMENTS: 8

AIR TRANSPORTATION ICAO-TI and IATA-DGR

PROPER SHIPPING NAME: Corrosive liquid, acidic, inorganic, n.o.s. (Nitric Acid, Hydrochloric Acid)

ICAO/IATA CLASS: 8

UN/ID NUMBER: 3264

PACKAGING GROUP: III

LABEL STATEMENTS: 8

OTHER AGENCIES:

TDG (TRANSPORT DANGEROUS GOODS)

DESCRIPTION OF GOODS: 3264 Corrosive liquid, acidic, inorganic, N.O.S. (Nitric Acid, Hydrochloric Acid)

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TDG CLASS: 8 Corrosive Substances



DANGER CODE (Kemler): 80

UN-NUMBER: 3264

PACKAGING GROUP: III

LABEL STATEMENTS: 8

SECTION 15: REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS:

TSCA (TOXIC SUBSTANCE CONTROL ACT): CAS# 7332-18-5 is listed on the TSCA Inventory. CAS#

7647-01-0 is listed on the TSCA Inventory. CAS# 7697-37-2 is listed on the TSCA inventory.

HEALTH AND SAFETY REPORTING LIST: None of the components are on this list.

CHEMICAL TEST RULES: None of the components are on this list.

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.

CERCLA (COMPREHENSIVE RESPONSE COMPENSATION, AND LIABILITY ACT) REPORTABLE QUANTITIES: CAS# 7647-01-0: final RQ=5000 pounds (2270 kg). CAS# 7637-37-2: final RQ=1000 pounds (454 kg).

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT):

Threshold Planning Quantities (TPQ): CAS# 7647-01-0: TPQ=500 pounds. CAS# 7697-37-2: TPQ=1000 pounds.

311/312 HAZARD CATEGORIES: CAS# 7697-37-2: acute, chronic, flammable. CAS# 7647-01-0: acute.

313 REPORTABLE INGREDIENTS: This material contains Nitric Acid (CAS# 7697-38-2) and Hydrochloric Acid (CAS# 7647-01-0), which are subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

CLEAN AIR ACT – HAZARDOUS AIR POLLUTANTS (HAPs): CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP).

CLEAN AIR ACT – CLASS 1 OZONE DEPLETORS: None of the components are on this list.

CLEAN AIR ACT – CLASS 2 OZONE DEPLETORS: None of the components are on this list.

CLEAN AIR ACT – HAZARDOUS SUBSTANCES: CAS# 7647-01-0; CAS# 7697-37-2 are listed as a hazardous substance under the CWA.

CELAN 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; CAS# 7697-37-2 are considered highly hazardous by OSHA.

STATE REGULATIONS:

Right to Know: Nitric Acid and Hydrochloric Acid can be found on the following state Right-to-Know lists: California, New Jersey, Florida, Pennsylvania, Minnesota and Massachusetts.

California Prop 65: No information available.

California No Significant Risk Level: No information available.

INTERNATIONAL REGULATIONS:

European Labelling in Accordance with EC Directives:

Hazard Symbols CAS# 7697-37-2 – OC. Risk Phrases: R 8 Contact with combustible material may cause fire. Safety Phrases: S 24/25 Avoid Contact with skin and eyes.

Hazard Symbols CAS# 7647-01-0 – Risk Phrases: R37 Irritating to respiratory system. Safety Phrases: S 2 Keep out of reach of children. S3/9 Keep in a cool, well-ventilated place. S 24/25 Avoid contact with skin and eyes. S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S 28A After contact with skin, wash immediately with plenty of water.

WGKK (Water Danger/Protection): No information available.

Canadian DSL/NDL: CAS# 7732-18-5; CAS# 7647-01-0; CAS# 7697-37-2 are listed.

Canadian WHMIS Classification: CAS# 7647-01-0 has a WHMIS classification of D1A, E. CAS# 7697-37-2 has a WHMIS classification of C, D1A, E.

Canadian Ingredient Disclosure List: CAS# 7647-01-0, CAS# 7697-37-2, CAS# 7789-18-6 are listed.

Exposure Limits:

CAS# 7647-01-0: OES – UK: STEL 5 ppm STEL; 7mg/m³ STEL.

CAS# 7697-37-2; OEL-ARAB Republic of Egypt: TWA 2 ppm (5 mg/m³)

OEL-AUSTRALIA: TWA 2 ppm (5 mg/m³); STEL 4 ppm (10 mg/m³)

OEL-BELGIUM: TWA 2 ppm (5.2 mg/m³); STEL 4 ppm (10 mg/m³)

OEL-CZECHOSLOVAKIA: TWA 2.5 mg/m³; STEL 5 mg/m³

OEL-DENMARK: TWA 2 ppm (5 mg/m²)

OEL-FINLAND: TWA 2 ppm (5 mg/m³); STEL 5 ppm (13 mg/m³);

Skin

OEL-GERMANY: TWA 10 ppm (25 mg/m³)

OEL-HUNGARY: STEL 5 mg/m³

OEL-JAPAN: TWA 2 ppm (5.2 mg/m³)

OEL-THE PHILIPPINES: TWA 2 ppm (5 mg/m³)

OEL-POLAND: TWA 10 mg/m³

OEL-RUSSIA: TWA 2 ppm; STEL 2 mg/m³; Skin

OEL-SWEDEN: TWA 2 ppm (5 mg/m³); STEL 5 ppm (13 mg/m³)

OEL-SWITZERLAND: TWA 2 ppm (5 mg/m³); STEL 4 ppm (10 mg/m³)

OEL-THAILAND: TWA 2 ppm (5 mg/m³)

OEL-TURKEY: TWA 2 ppm (5 mg/m³)

OEL-UNITED KINGDOM: TWA 2 ppm (5 mg/m³); STEL 4 ppm (10 mg/m³)

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mg/m³)

OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check

ACGIH

TLV



OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI
TLV

OES-United Kingdom: TWA 2 ppm TWA; 5 mg/m³ TWA

OES-United Kingdom: STEL 4 ppm; STEL 10 mg/m³

SECTION 16: OTHER INFORMATION

DISCLAIMER: The statements contained herein are offered for informational purposes only and are based upon technical data. DVS Sciences Inc. believes them to be accurate at the date of publication, but does not purport to be all-inclusive. The above-stated product is intended for use only by persons having the necessary technical skills and facilities for handling the product at their discretion and risk. Since conditions and manner of use are outside our control, we (DVS Sciences Inc.) make no warranty of merchantability or any such warranty, express or implied with respect to information and we assume no liability resulting from the above product or its use. Users should perform their own investigations to determine suitability of information and product for their particular purposes.