

ORION MATERIAL SAFETY DATA SHEET

SHEET 1 OF 2

ORION RESEARCH INCORPORATED
 THE SCHRAFFT CENTER
 529 MAIN STREET, BOSTON, MA 02129 USA
 TELEPHONE: 617-242-3900

I. PRODUCT IDENTIFICATION

PRODUCT NAME ORION APPLICATION SOLUTION CATALOG NO. EFFECTIVE DATE
 TISAB DOT IATA 940909 5/15/92

HAZARDOUS SHIPMENT LABELLING TESTING PER NACE (TM-01-69) HAS SHOWN THIS PRODUCT TO BE NON-CORROSIVE.

PREPARED BY THOMAS FLYNN TITLE QUALITY ASSURANCE CHEMIST
 APPROVED BY LYNN ORLOWIZ TITLE DIRECTOR REGULATORY MATTERS

II. HAZARDOUS INGREDIENTS (IDENTITY INFORMATION)

HAZARDOUS COMPONENTS*	CAS NO.	%	OSHA PEL	ACGIH TLV	LD LO MG/KG
SPECIFIC CHEMICAL IDENTITY: COMMON NAME(S)					
ACETIC ACID (ETANOIC ACID) (C2H4O2)NAO2	64-19-7	1.4	25 MG/M3	25 MG/M3	1,200 ORL-RBT
SODIUM ACETATE (C2H3NAO2)	127-09-3	8.2	NONE	NONE	1,300 (IVN-RBT)
**SODIUM CHLORIDE (NACL)	7647-14-5	5.8	NONE	NONE	8,000 (ORL-RBT)
TRANS - 1,2 - DIAMINO CYCLO- HEXANE TETRAACETIC ACID (CDTA)	482-54-2	0.4	NONE		150 (IPR-MOUSE)LD50
**DEIONIZED WATER (H2O)	7732-18-5	84.2	NONE	NONE	629,000 (ORL-DOG)

III. PHYSICAL DATA

BOILING POINT 760 MM HG 100'C FREEZING POINT -6'C
 SPECIFIC GRAVITY (H2O=1) 1.07 VAPOR PRESSURE @ NA
 PH@ 'C SOLUBILITY IN WATER,
 25 (5.0-5.5) % BY VOLUME WT. @ MISCIBLE
 VOLATILES, % BY WT. EVAPORATION RATE
 (BUTYL ACETATE = 1) N A
 VAPOR DENSITY (AIR=1) N A
 APPEARANCE AND ODOR NA

COLORLESS LIQUID, VINEGAR-LIKE ODOR

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (TEST METHOD) N A AUTOIGNITION TEMPERATURE NA
 FLAMMABLE LIMITS IN AIR, LOWER UPPER
 % BY VOLUME: NA NA
 EXTINGUISHING MEDIA

CARBON DIOXIDE, DRY CHEMICAL, ALCOHOL FOAM OR MIST.

SPECIAL FIRE-FIGHTING PROCEDURES
 USE SELF-CONTAINED BREATHING APPARATUS.

UNUSUAL FIRE AND EXPLOSION HAZARDS

NA

*CHEMICALS WHICH ARE NOT CLASSIFIED LIABILITY IS EXPRESSLY DOCUMENT NO.
 AS HAZARDOUS PER U.S. OSHA GUIDE- DISCLAIMED FOR ANY LOSS 205517-001
 LINES (29CFR PARTS 1915.2 OR1916.2) OR INJURY ARISING OUT OF REV. E
 OR THE MASSACHUSETTS SUBSTANCE LIST THE USE OF THIS INFORMATION
 (105CMR670.000 APPENDIX A) WILL NOT OR THE USE OF ANY MATERIALS
 NECESSARILY BE LISTED ON THIS FORM DESIGNATED. SAFE USE OF THE
 EVEN THOUGH ONE OR MORE MAY BE A MATERIALS IS THE RESPONSIBILITY
 CONSTITUENT OF THIS PRODUCT. OF THE USER.

* NA = NOT AVAILABLE/NOT APPLICABLE

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** NON-HAZARDOUS COMPONENT.

FORM MSDS/0191

ORION MATERIAL SAFETY DATA SHEET

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PRODUCT NAME: ORION APPLICATION SOLUTION TISAB CATALOG NO.: 940909

V. REACTIVITY DATA

STABILITY UNSTABLE STABLE X CONDITIONS TO AVOID HEAT OR FLAME
 INCOMPATIBILITY (MATERIALS TO AVOID) STRONG OXIDIZERS (HNO3, CHROMIC ACID
 SODIUM PEROXIDE), CONTACT WITH STRONG CAUSTICS CAN CAUSE SPATTERING.
 HAZARDOUS DECOMPOSITION PRODUCTS TOXIC GASES, SUCH AS CARBON MONOXIDE, MAY
 BE RELEASED DURING A FIRE.
 HAZARDOUS POLYMERIZATION CONDITION TO AVOID
 MAY OCCUR WILL NOT OCCUR X N A

VI. HEALTH HAZARD DATA

ROUTES OF ENTRY: INHALATION? SKIN? INGESTION?
 NO NO YES
 HEALTH HAZARDS (ACUTE AND CHRONIC) ACUTE - INGESTION MAY CAUSE NAUSEA,
 BREATHING DIFFICULTIES, AND DAMAGE TO STOMACHE AND DIGESTIVE TRACT. LOW HAZARD
 FOR SKIN AND INHALATION.
 CARCINOGENICITY: NTP? IARC MONOGRAPHS? OSHA REGULATED?
 NOT FOUND ON THESE LISTS.
 SIGNS AND SYMPTOMS OF EXPOSURE IRRITATION OF RESPIRATORY TRACT, UPSET STOMACHE
 OR NAUSEA, IRRITATION OF EYES, NOSE, THROAT.
 MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE RESPIRATORY AILMENTS,
 PERSONS WITH SENSITIVE SKIN MAY BE AFFECTED.
 EMERGENCY AND FIRST AID PROCEDURES SKIN, EYES - IRRIGATE WITH PLENTY OF
 WATER. INGESTION - DILUTE WITH LARGE AMOUNTS OF WATER. DO NOT INDUCE
 VOMITING. CONSULT PHYSICIAN.
 VII. PRECAUTIONS (SAFE HANDLING AND USE)
 STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
 VACUUM UP AND SET ASIDE FOR WASTE DISPOSAL.
 WASTE DISPOSAL METHOD
 DILUTE NEUTRALIZED SOLUTION DOWN DRAIN WITH EXCESS WATER. OBSERVE ALL FEDERAL,
 STATE, AND LOCAL LAWS WHEN DISPOSING OF THIS SOLUTION.
 PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
 KEEP AWAY FROM OXIDIZERS AND CAUSTICS. KEEP WELL SEALED AND STORE AT ROOM TEMP
 ERATURE. ACETIC ACID IS A CERCLA HAZARD AND IS SUBJECT TO SECTION 304 OF SARA
 TITLE III.
 OTHER PRECAUTIONS ALWAYS WASH HANDS THOROUGHLY WITH SOAP AND WATER AFTER WORK-
 ING WITH THIS MATERIAL. NFPA RATING: SCALE (0-4); HEALTH - 1, FIRE -1,
 REACTIVITY - 0, SPECIFIC - NONE. THIS PRODUCT IS NOT AFFECTED BY CAL. PROP. 65
 REPORTED IN EPA TSCA INVENTORY.
 VIII. CONTROL MEASURES
 RESPIRATORY PROTECTION (SPECIFY TYPE) N A
 VENTILATION LOCAL EXHAUST YES SPECIAL NO
 MECHANICAL (GENERAL) NO OTHER NO
 PROTECTIVE GLOVES YES EYE PROTECTION SAFETY GLASSES
 OTHER PROTECTIVE CLOTHING OR
 EQUIPMENT LAB COAT
 WORK/HYGENIC PRACTICES EMERGENCY EYE WASH SHOULD BE AVAILABLE.

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 529 MAIN STREET, BOSTON, MA 02129 USA
 TELEPHONE 617 / 242-3900

I. PRODUCT IDENTIFICATION

PRODUCT NAME: ORION APPLICATION SOLUTION TISAB
 CATALOG NO. 940909 EFFECTIVE DATE 5/31/89
 HAZARDOUS SHIPMENT LABELLING: DOT: IATA:
 TESTING PER NACE (TM-01-69) HAS SHOWN THIS PRODUCT TO BE NON CORROSIVE.
 PREPARED BY: THOMAS FLYNN TITLE: QUALITY ASSURANCE CHEMIST
 APPROVED BY: LYNN ORLOWITZ TITLE: DIRECTOR REGULATORY MATTERS

II. HAZARDOUS INGREDIENTS (IDENTITY INFORMATION)

HAZARDOUS COMPONENTS* ! CAS NO. ! % !OSHA PEL!ACGIH TLV !LD LO

ACETIC ACID	!	64-19-7	!1.4!25MG/M3	!	25MG/M3	!	ORL-RBT 1,200MG/KG
(ETHANOIC ACID) (C2H4O2)!	!	!	!	!	!	!	!
SODIUM ACETATE (C2H3NAO2)	!	127-09-3	!8.2!NONE	!	NONE	!	1,300 (IVN-RBT)
SODIUM CHLORIDE (NACL)	!	7647-14-5	!5.8!NONE	!	NONE	!	8,000 (ORL-RBT)
TRANS-1,2-DIAMINO CYCLOHEXANE TETRAACETIC ACID (CDTA)	!	25637-70-1	!0.4!NONE	!	NONE	!	150 (IPR-MOUSE)
DE-IONIZED WATER (H2O)	!	*NA	!84.2!NONE	!	NONE	!	NA

III. PHYSICAL DATA

BOILING POINT 760 MMHG:	100 C	FREEZING POINT:	-6 C
SPECIFIC GRAVITY (H2O=1):	1.07	VAPOR PRESSURE @:	NA
PH @ 25 C:	5.0 - 5.5	SOLUBILITY IN WATER, % BY WT @:	MISCIBLE
VOLATILES, % BY WT:	NA	EVAPORATION RATE (BUTYL ACETATE):	NA
VAPOR DENSITY (AIR =1):	NA		
APPEARANCE AND ODOR:	COLORLESS LIQUID, VINEGAR LIKE ODOR.		

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (TEST METHOD): NA AUTOIGNITION TEMPERATURE: NA
 FLAMMABLE LIMITS IN AIR, % BY VOLUME: LOWER: NA UPPER: NA
 EXTINGUISHING MEDIA: CARBON DIOXIDE, DRY CHEMICAL, ALCOHOL FOAM OR MIST.
 SPECIAL FIRE-FIGHTING PROCEDURES: USE SELF CONTAINED BREATHING APPARATUS.
 UNUSUAL FIRE AND EXPLOSION HAZARDS: NA

* CHEMICALS WHICH ARE NOT CLASSIFIED AS HAZARDOUS PER US OSHA GUIDELINES (29CFR PARTS 1915.2 OR 1916.2) OR THE MASSACHUSETTS SUBSTANCE LIST (105CMR670.000 APPENDIX A), WILL NOT NECESSARILY BE LISTED ON THIS FORM EVEN THOUGH ONE OR MORE MAY BE A CONSTITUENT OF THIS PRODUCT.

LIABILITY IS EXPRESSLY DISCLAIMED FOR ANY LOSS OR INJURY ARISING OUT OF THE USE OF THIS INFORMATION OR THE USE OF ANY MATERIALS DESIGNATED, SAFE USE OF THE MATERIALS IS THE RESPONSIBILITY OF THE USER.

* NA =NOT AVAILABLE/ NOT APPLICABLE DOCUMENT NO. 205517-001 REV. C
 **NON HAZARDOUS COMPONENT

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V. REACTIVITY DATA

STABILITY: STABLE
 CONDITIONS TO AVOID: HEAT OR FLAME
 INCOMPATIBILITY (MATERIALS TO AVOID): STRONG OXIDIZERS (HNO3), CHROMIC ACID SODIUM PEROXIDE), CONTACT WITH STRONG CAUSTICS CAN CAUSE SPATTERING.
 HAZARDOUS DECOMPOSITION PRODUCTS: TOXIC GASES SUCH AS CARBON MONOXIDE MAY BE RELEASED DURING A FIRE.
 HAZARDOUS POLYMERIZATION: WILL NOT OCCUR
 CONDITIONS TO AVOID: NA

VI. HEALTH HAZARD DATA

ROUTE(S) OF ENTRY: INHALATION? NO SKIN? NO INGESTION? YES
 HEALTH HAZARDS (ACUTE AND CHRONIC): ACUTE: INGESTION MAY CAUSE NAUSEA, BREATHING DIFFICULTIES, AND DAMAGE TO STOMACH AND DIGESTIVE TRACT. LOW HAZARD FOR SKIN AND INHALATION.
 CARCINOGENICITY: NTP? IARC MONOGRAPHS? OSHA REGULATED?
 NOT FOUND ON THESE LISTS
 SIGNS AND SYMPTOMS OF EXPOSURE: IRRITATION OF RESPIRATORY TRACT, UPSET STOMACH OR NAUSEA, IRRITATION OF EYES, NOSE, THROAT.
 MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: RESPIRATORY AILMENTS, PERSONS WITH SENSITIVE SKIN MAY BE AFFECTED.
 EMERGENCY AND FIRST AID PROCEDURES: EYES AND SKIN: IRRIGATE WITH PLENTY OF WATER. INTERNAL: DILUTE WITH LARGE AMOUNTS OF WATER. DO NOT INDUCE VOMITING. CONSULT PHYSICIAN.

VI. PRECAUTIONS (SAFE HANDLING AND USE)

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: VACUUM UP AND SET ASIDE FOR WASTE DISPOSAL.

WASTE DISPOSAL METHOD: DILUTE NEUTRALIZED SOLUTION DOWN DRAIN WITH EXCESS WATER: OBSERVE ALL FEDERAL, STATE, AND LOCAL LAWS WHEN DISPOSING OF THIS SOLUTION.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: KEEP AWAY FROM OXIDIZERS AND CAUSTICS. KEEP WELL SEALED AND STORE AT ROOM TEMPERATURE. ACETIC ACID IS A CERCLA HAZARD AND IS SUBJECT TO SECTION 304 OF SARA TITLE III.

OTHER PRECAUTIONS: ALWAYS WASH HANDS THOROUGHLY WITH SOAP AND WATER AFTER WORKING WITH THIS MATERIAL. NFPA RATING: SCALE (0-4) HEALTH 1, FIRE 1, REACTIVITY 0, SPECIFIC NONE

VIII. CONTROL MEASURES

RESPIRATORY PROTECTION (SPECIFY TYPE): NA
VENTILATION LOCAL EXHAUST: YES SPECIAL: NO
MECHANICAL (GENERAL): NO OTHER: NO

PROTECTIVE GLOVES: YES EYE PROTECTION: SAFETY GOGGLES
OTHER PROTECTIVE CLOTHING OR EQUIPMENT: LAB COAT
WORK/HYGIENIC PRACTICES: EMERGENCY EYE WASH SHOULD BE AVAILABLE.