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**SAFETY DATA SHEET**

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**SECTION 1. CHEMICAL IDENTIFICATION**

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CATALOG #: 41331

NAME: Dimethyl (R)-(+)-malate

SYNONYMS: Dimethyl (R)-2-hydroxysuccinate; Dimethyl D-malate;

24 HR EMERGENCY TELEPHONE: (800) 535-5053 (USA)  
352-323-3500 (INTERNATIONAL)

TO REQUEST AN SDS: (800) 869-9290

CUSTOMER SERVICE: (630) 766-2112

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**SECTION 2. HAZARD IDENTIFICATION**

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**CLASSIFICATION OF THE SUBSTANCE OR MIXTURE**  
NOT A HAZARDOUS SUBSTANCE OR MIXTURE

**GHA LABEL ELEMENTS, INCLUDING PRECAUTIONARY STATEMENTS**  
NOT A HAZARDOUS SUBSTANCE OR MIXTURE

**HAZARDS NOT OTHERWISE CLASSIFIED (HNOC) OR NOT COVERED BY GHS** NONE

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**SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS**

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MF: C6H10O5

MW: 162.14

CAS RN: 70681-41-3

PURITY:  $\geq 98\%$  (GC)

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#### SECTION 4. FIRST-AID MEASURES

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##### DESCRIPTION OF FIRST AID MEASURES

<b>GENERAL ADVICE</b>	IMMEDIATELY REMOVE ANY CLOTHING CONTAMINATED BY THE PRODUCT. MOVE OUT OF DANGEROUS AREA. CONSULT A PHYSICIAN AND SHOW THIS SAFETY DATA SHEET
<b>IF INHALED</b>	MOVE PERSON TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN AND CONSULT A PHYSICIAN
<b>IN CASE OF SKIN CONTACT</b>	IMMEDIATELY FLUSH SKIN WITH RUNNING WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. WASH CLOTHING BEFORE REUSE. CONSULT A PHYSICIAN IMMEDIATELY
<b>IN CASE OF EYE CONTACT</b>	IMMEDIATELY WASH SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS WITH FINGERS. IF IRRITATION PERSISTS, CONSULT A PHYSICIAN.
<b>IF SWALLOWED</b>	DO NOT INDUCE VOMITING. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. RINSE MOUTH WITH WATER. CONSULT A PHYSICIAN.
<b>MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED</b>	THE MOST IMPORTANT KNOWN SYMPTOMS AND EFFECTS ARE DESCRIBED IN THE LABELLING (SEE SECTION 2) AND/OR IN SECTION 11
<b>INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED</b>	NO DATA AVAILABLE

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#### SECTION 5. FIRE AND EXPLOSION DATA

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##### EXTINGUISHING MEDIA

<b>SUITABLE EXTINGUISHING MEDIA</b>	USE WATER SPRAY, DRY CHEMICAL, CARBON DIOXIDE OR CHEMICAL FOAM.
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**SPECIAL HAZARDS  
ARISING FROM THE  
SUBSTANCE OR MIXTURE**

CARBON OXIDES, NITROGEN OXIDES (NOX), SULPHUR OXIDES,  
POTASSIUM OXIDES

**ADVICE FOR  
FIREFIGHTERS**

WEAR SELF CONTAINED BREATHING APPARATUS FOR FIRE  
FIGHTING IF NECESSARY.

**FURTHER INFORMATION**

NO DATA AVAILABLE

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**SECTION 6. ACCIDENTAL RELEASE MEASURES**

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**PERSONAL  
PRECAUTIONS,  
PROTECTIVE EQUIPMENT  
AND EMERGENCY  
PROCEDURES**

WEAR PROTECTIVE EQUIPMENT AND KEEP UNPROTECTED  
PERSONNEL AWAY. ENSURE ADEQUATE VENTILATION. REMOVE ALL  
SOURCES OF IGNITION. PREVENT FURTHER LEAK OR SPILL IF SAFE  
TO DO SO.

FOR PERSONAL PROTECTION SEE SECTION 8.

**ENVIRONMENTAL  
PRECAUTIONS**

PREVENT FURTHER LEAKAGE OR SPILLAGE IF SAFE TO DO SO. DO  
NOT LET PRODUCT ENTER DRAINS. DISCHARGE INTO THE  
ENVIRONMENT MUST BE AVOIDED.

**METHODS AND  
MATERIALS FOR  
CONTAINMENT AND  
CLEANING UP**

PREVENT FURTHER LEAK OR SPILL IF SAFE TO DO SO. VACUUM,  
SWEEP UP, OR ABSORB WITH INERT MATERIAL AND PLACE INTO A  
SUITABLE DISPOSAL CONTAINER. CONSULT LOCAL REGULATIONS  
FOR DISPOSAL

**REFERENCE TO OTHER  
SECTIONS**

FOR DISPOSAL SEE SECTION 13.

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**SECTION 7. HANDLING AND STORAGE**

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**PRECAUTIONS FOR SAFE  
HANDLING**

AVOID CONTACT WITH SKIN, EYES, AND PERSONAL CLOTHING.  
WASH HANDS THOROUGHLY AFTER HANDLING. AVOID BREATHING  
FUMES. USE ONLY WITH ADEQUATE VENTILATION. WEAR SUITABLE  
PROTECTIVE CLOTHING, GLOVES, AND EYE/FACE PROTECTION.  
KEEP AWAY FROM SOURCES OF IGNITION. MINIMIZE DUST  
GENERATION AND ACCUMULATION. KEEP CONTAINER TIGHTLY  
CLOSED. OPEN AND HANDLE CONTAINER WITH CARE. DO NOT EAT,  
DRINK, OR SMOKE WHILE HANDLING.  
FOR PRECAUTIONS SEE SECTION 2.

**CONDITIONS FOR SAFE  
STORAGE, INCLUDING  
ANY INCOMPATIBILITIES**

STORE IN A TIGHTLY CLOSED CONTAINER WHEN NOT IN USE. STORE  
IN A COOL, DRY, WELL-VENTILATED AREA AWAY FROM  
INCOMPATIBLE SUBSTANCES. KEEP AWAY FROM SOURCES OF  
IGNITION.

**RECOMMENDED  
STORAGE TEMPERATURE**

Store at 2 - 8 °C

**SPECIFIC END USE(S)**

FOR LABORATORY USE ONLY

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**SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

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**CONTROL PARAMETERS**

**COMPONENTS WITH  
WORKPLACE CONTROL  
PARAMETERS**

CONTAINS NO SUBSTANCES WITH OCCUPATIONAL EXPOSURE LIMIT VALUES.

**EXPOSURE CONTROLS**

**APPROPRIATE  
ENGINEERING CONTROLS**

AVOID CONTACT WITH SKIN, EYES, AND CLOTHING. WASH HANDS BEFORE BREAKS AND IMMEDIATELY AFTER HANDLING THE PRODUCT. FACILITIES STORING OR UTILIZING THIS MATERIAL SHOULD BE EQUIPPED WITH AN EYEWASH FOUNTAIN. USE ADEQUATE VENTILATION TO KEEP AIRBORNE CONCENTRATIONS LOW.

**PERSONAL PROTECTIVE EQUIPMENT**

**EYE/FACE PROTECTION**

SAFETY GLASSES WITH SIDE-SHIELDS CONFORMING TO EN166 USE EQUIPMENT FOR EYE PROTECTION TESTED AND APPROVED UNDER APPROPRIATE GOVERNMENT STANDARDS SUCH AS NIOSH (US) OR EN166 (EU).

**SKIN PROTECTION**

HANDLE WITH GLOVES. GLOVES MUST BE INSPECTED PRIOR TO USE. USE PROPER GLOVE REMOVAL TECHNIQUE (WITHOUT TOUCHING GLOVE'S OUTER SURFACE) TO AVOID SKIN CONTACT WITH THIS PRODUCT. DISPOSE OF CONTAMINATED GLOVES AFTER USE IN ACCORDANCE WITH APPLICABLE LAWS AND GOOD LABORATORY PRACTICES. WASH AND DRY HANDS.

**BODY PROTECTION**

IMPERVIOUS CLOTHING, THE TYPE OF PROTECTIVE EQUIPMENT MUST BE SELECTED ACCORDING TO THE CONCENTRATION AND AMOUNT OF THE DANGEROUS SUBSTANCE AT THE SPECIFIC WORKPLACE.

**RESPIRATORY  
PROTECTION**

WHERE RISK ASSESSMENT INDICATES AIR-PURIFYING RESPIRATORS ARE REQUIRED USE A DUST MASK TYPE N95 (US) OR TYPE P1 (EN 143) RESPIRATOR. RESPIRATORS AND COMPONENTS MUST TESTED AND APPROVED UNDER APPROPRIATE GOVERNMENT STANDARDS - NIOSH (US) OR CEN (EU).

**CONTROL OF ENVIRONMENTAL EXPOSURE**

PREVENT FURTHER LEAKAGE OR SPILLAGE IF SAFE TO DO SO. DO NOT LET PRODUCT ENTER DRAINS. DISCHARGE INTO THE ENVIRONMENT MUST BE AVOIDED.

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**SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**

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**INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES**

APPEARANCE	Colorless liquid
ODOR	NO DATA AVAILABLE
ODOR THRESHOLD	NO DATA AVAILABLE
pH	NO DATA AVAILABLE
MELTING/FREEZING POINT	
INITIAL BOILING POINT AND BOILING RANGE	104 - 108 °C / 1 mmHg (Lit.)
FLASH POINT	113 °C
EVAPORATION RATE	NO DATA AVAILABLE
FLAMMABILITY (SOLID, GAS)	NO DATA AVAILABLE
UPPER/LOWER FLAMMABILITY OR EXPLOSIVE LIMITS	NO DATA AVAILABLE
VAPOR PRESSURE	NO DATA AVAILABLE
VAPOR DENSITY	NO DATA AVAILABLE
RELATIVE DENSITY	1.232 g / mL at 25 °C (Lit.)
WATER SOLUBILITY	NO DATA AVAILABLE
PARTITION COEFFICIENT: N- OCTANOL/ WATER	NO DATA AVAILABLE
AUTO-IGNITION TEMPERATURE	NO DATA AVAILABLE
DECOMPOSITION TEMPERATURE	NO DATA AVAILABLE
VISCOSITY	NO DATA AVAILABLE
EXPLOSIVE PROPERTIES	NO DATA AVAILABLE
OXIDIZING PROPERTIES	NO DATA AVAILABLE
<b>OTHER SAFETY INFORMATION</b>	NO DATA AVAILABLE

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**SECTION 10. STABILITY AND REACTIVITY**

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REACTIVITY	NO DATA AVAILABLE
CHEMICAL STABILITY	STABLE UNDER RECOMMENDED STORAGE CONDITIONS.

<b>POSSIBILITY OF HAZARDOUS REACTIONS</b>	NO DATA AVAILABLE
<b>CONDITIONS TO AVOID</b>	HEAT, FLAMES AND SPARKS
<b>INCOMPATIBLE MATERIALS</b>	STRONG OXIDIZING AGENTS
<b>HAZARDOUS DECOMPOSITION PRODUCTS</b>	CARBON MONOXIDE, NITROGEN OXIDES, HYDROGEN CHLORIDE IN THE EVENT OF FIRE: SEE SECTION 5

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**SECTION 11. TOXICOLOGICAL INFORMATION**

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**INFORMATION ON TOXICOLOGICAL EFFECTS**

**ACUTE TOXICITY** NO DATA AVAILABLE

**SKIN CORROSION/IRRITATION** NO DATA AVAILABLE

**SERIOUS EYE DAMAGE/EYE IRRITATION** NO DATA AVAILABLE

**RESPIRATORY OR SKIN SENSITISATION** NO DATA AVAILABLE

**GERM CELL MUTAGENICITY** NO DATA AVAILABLE

**CARCINOGENICITY**

IARC: NO COMPONENT OF THIS PRODUCT PRESENT AT LEVELS GREATER THAN OR EQUAL TO 0.1% IS IDENTIFIED AS PROBABLE, POSSIBLE OR CONFIRMED HUMAN CARCINOGEN BY IARC.

ACGIH: NO COMPONENT OF THIS PRODUCT PRESENT AT LEVELS GREATER THAN OR EQUAL TO 0.1% IS IDENTIFIED AS A CARCINOGEN OR POTENTIAL CARCINOGEN BY ACGIH.

NTP: NO COMPONENT OF THIS PRODUCT PRESENT AT LEVELS GREATER THAN OR EQUAL TO 0.1% IS IDENTIFIED AS A KNOWN OR ANTICIPATED CARCINOGEN BY NTP.

OSHA: NO COMPONENT OF THIS PRODUCT PRESENT AT LEVELS GREATER THAN OR EQUAL TO 0.1% IS IDENTIFIED AS A CARCINOGEN OR POTENTIAL CARCINOGEN BY OSHA.

<b>REPRODUCTIVE TOXICITY</b>	NO DATA AVAILABLE
<b>SPECIFIC TARGET ORGAN TOXICITY - SINGLE EXPOSURE</b>	NO DATA AVAILABLE
<b>SPECIFIC TARGET ORGAN TOXICITY - REPEATED EXPOSURE</b>	NO DATA AVAILABLE
<b>ASPIRATION HAZARD</b>	NO DATA AVAILABLE
<b>ADDITIONAL INFORMATION</b>	RTECS: NOT AVAILABLE TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL AND TOXICOLOGICAL PROPERTIES OF THIS SUBSTANCE HAVE NOT BEEN THOROUGHLY INVESTIGATED.

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**SECTION 12. ECOLOGICAL INFORMATION**

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<b>TOXICITY</b>	NO DATA AVAILABLE
<b>PERSISTENCE AND DEGRADABILITY</b>	NO DATA AVAILABLE
<b>BIOACCUMULATIVE POTENTIAL</b>	NO DATA AVAILABLE
<b>MOBILITY IN SOIL</b>	NO DATA AVAILABLE
<b>RESULTS OF PBT AND VPVB ASSESSMENT</b>	PBT/VPVB ASSESSMENT NOT AVAILABLE AS CHEMICAL SAFETY ASSESSMENT NOT REQUIRED/NOT CONDUCTED
<b>OTHER ADVERSE EFFECTS</b>	NO DATA AVAILABLE

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**SECTION 13. DISPOSAL CONSIDERATIONS**

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**WASTE TREATMENT METHODS**

<b>PRODUCT</b>	OFFER SURPLUS AND NON-RECYCLABLE CHEMICAL TO A LICENSED DISPOSAL COMPANY. CONTACT A LICENSED PROFESSIONAL WASTE DISPOSAL SERVICE TO DISPOSE OF THIS MATERIAL.
<b>CONTAMINATED PACKAGING</b>	DISPOSE OF AS UNUSED PRODUCT.

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**SECTION 14. TRANSPORT INFORMATION**

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**DOT (US)**

NOT DANGEROUS GOODS

**IMDG**

NOT DANGEROUS GOODS

**IATA**

NOT DANGEROUS GOODS

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**SECTION 15. REGULATORY INFORMATION**

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**SARA 302 COMPONENTS**

SARA 302: NO CHEMICALS IN THIS MATERIAL ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SARA TITLE III, SECTION 302.

**SARA 313 COMPONENTS**

SARA 313: THIS MATERIAL DOES NOT CONTAIN ANY CHEMICAL COMPONENTS WITH KNOWN CAS NUMBERS THAT EXCEED THE THRESHOLD (DE MINIMIS) REPORTING LEVELS ESTABLISHED BY SARA TITLE III, SECTION 313.

**MASSACHUSETTS RIGHT TO KNOW COMPONENTS**

NO COMPONENTS ARE SUBJECT TO THE MASSACHUSETTS RIGHT TO KNOW ACT.

**PENNSYLVANIA RIGHT TO KNOW COMPONENTS**

	CAS RN	REVISION DATE
Dimethyl (R)-(+)-malate	70681-41-3	

**NEW JERSEY RIGHT TO KNOW COMPONENTS**

	CAS RN	REVISION DATE
Dimethyl (R)-(+)-malate	70681-41-3	

**CALIFORNIA PROP. 65 COMPONENTS**

THIS PRODUCT DOES NOT CONTAIN ANY CHEMICALS KNOWN TO STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS, OR ANY OTHER REPRODUCTIVE HARM.



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**SECTION 16. OTHER INFORMATION**

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## SDS LEGEND

MW:	MOLECULAR WEIGHT
MF:	MOLECULAR FORMULA
VOC:	VOLATILE ORGANIC COMPOUNDS
ACGIH:	AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGINISTS
CAS RN:	CHEMICAL ABSTRACTS SERVICE REGISTRY NUMBER
OSHA:	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PEL:	PERMISSIBLE EXPOSURE LIMIT (OSHA)
TLV:	THRESHOLD LIMIT VALUE (ACGIH)

## IMPORTANT:

*THE INFORMATION ABOVE IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES. IN NO EVENT SHALL **CII** BE LIABLE FOR ANY CLAIMS, LOSSES, OR DAMAGES OF ANY THIRD PARTY OR FOR LOST PROFITS OR ANY SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES, HOWSOEVER ARISING, EVEN IF **CII** HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.*

