A CAP Reagent (641)

000000011296

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	A CAP Reagent (641)
MSDS Number	:	000000011296
Product Use Description	:	Capping Reagent for DNA/RNA Synthesis
Manufacturer or supplier's details	:	Honeywell International Inc. 101 Columbia Road Morristown, NJ 07962-1057
For more information call	:	1-800-368-0050 +1-231-726-3171 (Monday-Friday, 9:00am-5:00pm)
In case of emergency call	:	**Medical: 1-800-498-5701 or +1-303-389-1414**
	:	**Transportation (CHEMTREC): 1-800-424-9300 or +1-703-527-3887**
	:	
	:	(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form	:	liquid, clear
Color	:	colourless
Odor	:	ether-like

Classification of the substance or mixture

Classification of the substance or mixture	:	Flammable liquids, Category 2 Acute toxicity, Category 4, Oral Skin corrosion, Category 1B Serious eye damage, Category 1 Carcinogenicity, Category 2

Specific target organ toxicity - single exposure, Category 3, Respiratory system

GHS Label elements, including precautionary statements

Symbol(s) :

Signal word : Danger

Hazard statements : Highly flammable liquid and vapour.
Harmful if swallowed.
Causes severe skin burns and eye damage.
May cause respiratory irritation.
Suspected of causing cancer.

Precautionary statements : **Prevention:**
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ ventilating/ lighting/ equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
Wash skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/ eye protection/ face protection.

Response:
IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes.

Remove contact lenses, if present and easy to do. Continue rinsing.
Immediately call a POISON CENTER or doctor/ physician.
Wash contaminated clothing before reuse.
In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Storage:
Store in a well-ventilated place. Keep container tightly closed.
Keep cool.
Store locked up.

Disposal:
Dispose of contents/ container to an approved waste disposal plant.

Carcinogenicity

ACGIH:	Tetrahydrofuran	109-99-9
	A3: Confirmed animal carcinogen	
	Pyridine	110-86-1
	A3: Confirmed animal carcinogen	

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature : Mixture

Chemical Name	CAS-No.	Concentration
Tetrahydrofuran	109-99-9	80.00 %
Acetic anhydride	108-24-7	10.00 %
Pyridine	110-86-1	10.00 %

SECTION 4. FIRST AID MEASURES

Inhalation	:	Call a physician immediately. Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is present.
Skin contact	:	Wash off immediately with plenty of water for at least 15 minutes. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Call a physician immediately.
Eye contact	:	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Call a physician immediately.
Ingestion	:	Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Call a physician immediately.

Notes to physician

Treatment	:	Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Alcohol-resistant foam Carbon dioxide (CO2) Dry chemical Cool closed containers exposed to fire with water spray.
Unsuitable extinguishing media	:	Do not use a solid water stream as it may scatter and spread fire.
Specific hazards during firefighting	:	Extremely flammable. Vapours may form explosive mixtures with air. Vapours are heavier than air and may spread along floors. Vapors may travel to areas away from work site before igniting/flashing back to vapor source. May form explosive peroxides. Reacts violently with water. In case of fire hazardous decomposition products may be

produced such as:
Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke.
Hydrogen cyanide (hydrocyanic acid)
Ammonia

Special protective equipment for firefighters : Wear self-contained breathing apparatus and protective suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Wear personal protective equipment.
Immediately evacuate personnel to safe areas.
Keep people away from and upwind of spill/leak.
Ensure adequate ventilation.
Remove all sources of ignition.
Do not swallow.
Do not breathe vapours or spray mist.
Do not get in eyes, on skin, or on clothing.

Environmental precautions : Prevent further leakage or spillage if safe to do so.
Prevent product from entering drains.
Discharge into the environment must be avoided.
Do not flush into surface water or sanitary sewer system.
Do not allow run-off from fire fighting to enter drains or water courses.

Methods for cleaning up : Ventilate the area.
No sparking tools should be used.
Use explosion-proof equipment.
Contain and collect spillage with non-combustible absorbent materials, e.g. sand, earth, vermiculite, diatomaceous earth and place in container for disposal according to local regulations (see section 13).

SECTION 7. HANDLING AND STORAGE

Handling

Handling : Wear personal protective equipment.
Use only in well-ventilated areas.

Keep container tightly closed.
Do not smoke.
Do not swallow.
Do not breathe vapours or spray mist.
Do not get in eyes, on skin, or on clothing.

Advice on protection against fire and explosion : Keep away from fire, sparks and heated surfaces.
Take precautionary measures against static discharges.
Ensure all equipment is electrically grounded before beginning transfer operations.
Use explosion-proof equipment.
Keep product and empty container away from heat and sources of ignition.
No sparking tools should be used.
No smoking.

Storage

Requirements for storage areas and containers : Store in area designed for storage of flammable liquids.
Protect from physical damage.
Keep containers tightly closed in a dry, cool and well-ventilated place.
Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Keep away from heat and sources of ignition.
Keep away from direct sunlight.
Protect from exposure to air/oxygen (peroxide formation).
Store away from incompatible substances.
Container hazardous when empty.
Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective measures : Ensure that eyewash stations and safety showers are close to the workstation location.

Engineering measures : Use with local exhaust ventilation.
Prevent vapour buildup by providing adequate ventilation during and after use.

Eye protection : Do not wear contact lenses.

Wear as appropriate:
Safety glasses with side-shields
If splashes are likely to occur, wear:
Goggles or face shield, giving complete protection to eyes

Hand protection : Solvent-resistant gloves
Gloves must be inspected prior to use.
Replace when worn.

Skin and body protection : Wear as appropriate:
Solvent-resistant apron
Flame retardant antistatic protective clothing
If splashes are likely to occur, wear:
Protective suit

Respiratory protection : In case of insufficient ventilation wear suitable respiratory equipment.
For rescue and maintenance work in storage tanks use self-contained breathing apparatus.
Use NIOSH approved respiratory protection.

Hygiene measures : When using, do not eat, drink or smoke.
Wash hands before breaks and immediately after handling the product.
Keep working clothes separately.
Remove and wash contaminated clothing before re-use.
Do not swallow.
Do not breathe vapours or spray mist.
Do not get in eyes, on skin, or on clothing.
This material has an established AIHA ERPG exposure limit.
The current list of ERPG exposure limits can be found at http://www.aiha.org/insideaiha/GuidelineDevelopment/ERPG/Documents/2011erpgweelhandbook_table-only.pdf.

Exposure Guidelines

Components	CAS-No.	Value	Control parameters	Update	Basis
Tetrahydrofuran	109-99-9	SKIN_DES : Skin designation:	Can be absorbed through the skin.	2008	ACGIH:US. ACGIH Threshold Limit Values

Tetrahydrofuran	109-99-9	TWA : time weighted average	(50 ppm)	2008	ACGIH:US. ACGIH Threshold Limit Values
Tetrahydrofuran	109-99-9	STEL : Short term exposure limit	(100 ppm)	2008	ACGIH:US. ACGIH Threshold Limit Values
Tetrahydrofuran	109-99-9	REL : Recommended exposure limit (REL):	590 mg/m3 (200 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards
Tetrahydrofuran	109-99-9	STEL : Short term exposure limit	735 mg/m3 (250 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards
Tetrahydrofuran	109-99-9	PEL : Permissible exposure limit	590 mg/m3 (200 ppm)	02 2006	OSHA_TRANS:US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Tetrahydrofuran	109-99-9	STEL : Short term exposure limit	735 mg/m3 (250 ppm)	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)
Tetrahydrofuran	109-99-9	TWA : time weighted average	590 mg/m3 (200 ppm)	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)

Acetic anhydride	108-24-7	STEL : Short term exposure limit	(3 ppm)	12 2010	ACGIH:US. ACGIH Threshold Limit Values
Acetic anhydride	108-24-7	TWA : time weighted average	(1 ppm)	12 2010	ACGIH:US. ACGIH Threshold Limit Values
Acetic anhydride	108-24-7	Ceil_Time : Ceiling Limit Value and Time Period (if specified) :	20 mg/m3 (5 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards
Acetic anhydride	108-24-7	PEL : Permissible exposure limit	20 mg/m3 (5 ppm)	02 2006	OSHA_TRANS:US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Acetic anhydride	108-24-7	Ceiling : Ceiling Limit Value:	20 mg/m3 (5 ppm)	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)
Pyridine	110-86-1	TWA : time weighted average	(1 ppm)	2008	ACGIH:US. ACGIH Threshold Limit Values
Pyridine	110-86-1	REL : Recommended exposure limit (REL):	15 mg/m3 (5 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards

Pyridine	110-86-1	PEL : Permissible exposure limit	15 mg/m3 (5 ppm)	02 2006	OSHA_TRANS:US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Pyridine	110-86-1	TWA : time weighted average	15 mg/m3 (5 ppm)	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state : liquid, clear

Color : colourless

Odor : ether-like

pH : Note: not determined

Melting point/freezing point : -108.5 °C
Note: The physical data is that of the main component.

Boiling point/boiling range : 66 °C
Note: The physical data is that of the main component.

Flash point : 5 °F (-15 °C)
Method: closed cup

Lower explosion limit : 2 %(V)

Upper explosion limit : 11.8 %(V)

Vapor pressure : 189 hPa

		at 20 °C(68 °F)Note: The physical data is that of the main component.
Density	:	0.888 g/cm3 at 20 °C Note: The physical data is that of the main component.
Water solubility	:	Note: completely soluble
Ignition temperature	:	321 °C Method: The physical data is that of the main component.

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under recommended storage conditions.
Possibility of hazardous reactions	:	Hazardous polymerisation does not occur.
Conditions to avoid	:	Heat, flames and sparks. Keep away from direct sunlight. Protect from exposure to air/oxygen (peroxide formation). Protect against light. Protect against water.
Incompatible materials to avoid	:	Strong oxidizing agents Strong acids and strong bases May form explosive peroxides. May attack many plastics, rubbers and coatings. Water Alcohols Boric Acid Chloroformates Amines Acid chlorides Fluorine

Hazardous decomposition products	:	Peroxides In case of fire hazardous decomposition products may be produced such as: Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke. Hydrogen cyanide (hydrocyanic acid) Ammonia

SECTION 11. TOXICOLOGICAL INFORMATION

Acute oral toxicity

Tetrahydrofuran	:	LD50: 1,650 mg/kg Species: rat
Acetic anhydride	:	LD50: 1,780 mg/kg Species: rat
Pyridine	:	LD50: 891 mg/kg Species: rat

Acute inhalation toxicity

Tetrahydrofuran	:	LC50: ca. 61.9 mg/l 21000 ppm Exposure time: 3 h Species: rat
Acetic anhydride	:	LC0: 1000 ppm Exposure time: 4 h Species: rat LC100: 2000 ppm Exposure time: 4 h Species: rat
Pyridine	:	LC50: 8796 ppm Exposure time: 1 h Species: rat

Acute dermal toxicity

Acetic anhydride	:	LD50: 4,000 mg/kg Species: rabbit

Pyridine	:	LD50: 1,121 mg/kg Species: rabbit
Skin irritation		
Tetrahydrofuran	:	Species: rabbit Result: Irritating to skin.
Acetic anhydride	:	Species: human Result: Corrosive
Eye irritation		
Tetrahydrofuran	:	Species: rabbit Result: Irritating to eyes.
Acetic anhydride	:	Species: human Classification: Corrosive
Pyridine	:	Species: rabbit Result: Severe eye irritation Note: Corneal opacity
Repeated dose toxicity		
Acetic anhydride	:	Species: rat Application Route: Inhalation Dose: Intermittent – 40 ppm or 167.2 mg/m3 Exposure time: (2 Weeks) Respiratory disorders Lachrymation Shortness of breath Fatality Species: rat Application Route: Inhalation Exposure time: (13 Weeks) NOEL: 1 ppm Local effects Respiratory irritation Species: rat Application Route: Inhalation Exposure time: (13 Weeks)

Systemic toxicity
No systemic toxicity was observed at 20 ppm (the highest level tested).

Pyridine : Species: rat
Application Route: Inhalation
Target Organs: Liver
(10 or 50 ppm; 7 hours/day, 5 days/week for 6 months)
Based on experimental results, may cause adverse health effects on the following:
Liver

Species: rat
Application Route: Oral
NOEL: 1 mg/kg
Target Organs: Liver, Kidney
Causes damage to the following organs: liver, kidneys.

Genotoxicity in vitro

Acetic anhydride : Test Method: Ames test
Result: negative

Pyridine : Test Method: Ames test
Result: negative

: Test Method: Chromosome aberration test in vitro
Cell type: Chinese Hamster Ovary Cells
Result: negative

: Test Method: Cell Transformation Test
Result: negative

Genotoxicity in vivo

Acetic anhydride : Species: rat
Cell type: Micronucleus
Application Route: Inhalation
Result: negative

Further information

Tetrahydrofuran	:	Note: Confirmed animal carcinogen with unknown relevance to humans.
Pyridine	:	Note: Confirmed animal carcinogen with unknown relevance to humans.

SECTION 12. ECOLOGICAL INFORMATION

Toxicity to fish

Tetrahydrofuran	:	LC50: 2,160 mg/l Exposure time: 96 h Species: Fathead minnow LC50: 2,820 mg/l Species: Leuciscus idus (Golden orfe)
Acetic anhydride	:	LC50: 265 mg/l Exposure time: 48 h Species: Leuciscus idus (Golden orfe)
Pyridine	:	flow-through test LC50: 106 mg/l Exposure time: 96 h Species: Pimephales promelas (fathead minnow)

Toxicity to daphnia and other aquatic invertebrates

Acetic anhydride	:	LC50: 55 mg/l Exposure time: 24 h Species: Daphnia magna (Water flea)

Toxicity to bacteria

Tetrahydrofuran	:	LC50: > 580 mg/l Exposure time: 16 h Species: Bacteria

Further information on ecology

Additional ecological	:	Harmful to aquatic organisms.

information

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods : Observe all Federal, State, and Local Environmental regulations.

SECTION 14. TRANSPORT INFORMATION

DOT

UN/ID No.	:	UN 2924
Proper shipping name	:	FLAMMABLE LIQUID, CORROSIVE, N.O.S. (Tetrahydrofuran, Acetic anhydride, Pyridine)
Class		3
Packing group		II
Hazard Labels		3 (8)

IATA

UN/ID No.	:	UN 2924
Description of the goods	:	FLAMMABLE LIQUID, CORROSIVE, N.O.S. (Tetrahydrofuran, Acetic anhydride, Pyridine)
Class	:	3
Packaging group	:	II
Hazard Labels	:	3 (8)
Packing instruction (cargo aircraft)	:	363
Packing instruction (passenger aircraft)	:	352
Packing instruction (passenger aircraft)	:	Y340

IMDG

UN/ID No.	:	UN 2924
Description of the goods	:	FLAMMABLE LIQUID, CORROSIVE, N.O.S. (TETRAHYDROFURAN, ACETIC ANHYDRIDE, PYRIDINE)
Class	:	3
Packaging group	:	II
Hazard Labels	:	3 (8)
EmS Number	:	F-E, S-C
Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

Inventories

US. Toxic Substances Control Act	:	On TSCA Inventory
Australia. Industrial Chemical (Notification and Assessment) Act	:	On the inventory, or in compliance with the inventory
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)	:	All components of this product are on the Canadian DSL.
Japan. Kashin-Hou Law List	:	On the inventory, or in compliance with the inventory
Korea. Toxic Chemical Control Law (TCCL) List	:	On the inventory, or in compliance with the inventory
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	:	On the inventory, or in compliance with the inventory
China. Inventory of Existing Chemical Substances	:	On the inventory, or in compliance with the inventory
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	:	On the inventory, or in compliance with the inventory
TSCA 12B	:	US. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpt D)

Tetrahydrofuran 109-99-9

National regulatory information

US. Drug Enforcement	:	On the United States Drug Enforcement Authority (DEA) List of

Administration (DEA) Listed Precursor and Essential Chemicals (21 CFR 1310)		Precursors and Essential Chemicals :	
	:	Acetic anhydride	108-24-7
US. EPA CERCLA Hazardous Substances (40 CFR 302)	:	The following component(s) of this product is/are subject to release reporting under 40 CFR 302 when release exceeds the Reportable Quantity (RQ): Reportable quantity: 1000 lbs	
	:	Tetrahydrofuran	109-99-9
	:	Pyridine	110-86-1
	:	Reportable quantity: 5000 lbs	
	:	Acetic anhydride	108-24-7
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	:	The following components are subject to reporting levels established by SARA Title III, Section 313:	
	:	Pyridine	110-86-1
SARA 311/312 Hazards	:	Fire Hazard Acute Health Hazard Chronic Health Hazard Reactivity Hazard	
CERCLA Reportable Quantity	:	1250 lbs	
California Prop. 65	:	WARNING! This product contains a chemical known to the State of California to cause cancer.	
		Pyridine	110-86-1
Massachusetts RTK	:	Acetic anhydride	108-24-7
	:	Tetrahydrofuran	109-99-9
	:	Pyridine	110-86-1

New Jersey RTK	:	Acetic anhydride	108-24-7
	:	Tetrahydrofuran	109-99-9
	:	Pyridine	110-86-1
Pennsylvania RTK	:	Acetic anhydride	108-24-7
	:	Tetrahydrofuran	109-99-9
	:	Pyridine	110-86-1
WHMIS Classification	:	B2: Flammable liquid B6: Reactive Flammable Material E: Corrosive Material This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.	

SECTION 16. OTHER INFORMATION

		HMIS III	NFPA
Health hazard	:	3*	3
Flammability	:	3	3
Physical Hazard	:	1	
Instability	:		1

* - Chronic health hazard

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Final determination of suitability of any material is the sole responsibility of the user. This information should not constitute a guarantee for any specific product properties.

Changes since the last version are highlighted in the margin. This version replaces all previous versions.

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