

A CAP Reagent (641)

Version 1

Revision Date 02/20/2009

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SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : A CAP Reagent (641)
MSDS Number : 000000011296
Product Use Description : Capping Reagent for DNA/RNA Synthesis

Company : Honeywell International Inc.
1953 South Harvey Street
Muskegon, MI 49442

For more information call : 1-800-368-0050
(Monday-Friday, 9:00am-5:00pm)

In case of emergency call : Medical: 1-800-498-5701
: **Transportation: 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

Hazard Summary : Extremely flammable. In use, may form flammable/explosive vapour-air mixture. May form explosive peroxides. Reacts violently with water. Corrosive. Causes burns. Harmful by inhalation. May be harmful if swallowed. May be harmful if absorbed through skin. Irritating to eyes, respiratory system and skin. Repeated exposure may cause skin dryness or cracking.

Potential Health Effects

Skin : Causes skin burns.
May be harmful if absorbed through skin.
May cause systemic poisoning with symptoms paralleling those of inhalation.
Prolonged or repeated skin contact with liquid may cause defatting resulting in drying, redness and possible blistering.
May cause photosensitisation.

Eyes : Causes eye burns.
May cause corneal injury.

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- Ingestion** : Causes digestive tract burns.
Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.
May cause systemic poisoning with symptoms paralleling those of inhalation.
- Inhalation** : Inhaled corrosive substances can lead to a toxic oedema of the lungs.
Causes headache, drowsiness or other effects to the central nervous system.
- Chronic Exposure** : Repeated and prolonged exposure to solvents may cause brain and nervous system damage.
Repeated or prolonged exposure to the substance can produce kidney damage.
Repeated or prolonged exposure to the substance can produce liver damage.
Prolonged or repeated skin contact with liquid may cause defatting resulting in drying, redness and possible blistering.
- Aggravated Medical Condition** : Liver disorders
Kidney disorders
Respiratory disorders
Skin disorders
Eye disorders
- Target Organs** : Eyes
Skin
Respiratory system
Central nervous system
Liver
Kidney
Gastrointestinal tract

Carcinogenicity

ACGIH:	Tetrahydrofuran	109-99-9
	Pyridine	110-86-1

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Tetrahydrofuran	109-99-9	80.00
Acetic anhydride	108-24-7	10.00

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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. FIRE-FIGHTING MEASURES

- Flash point : -15 °C (5 °F)
closed cup
- Ignition temperature : 321 °C (610 °F)
The physical data is that of the main component.
- Lower explosion limit : 11.8 %(V)
- Upper explosion limit : 2 %(V)
- Suitable extinguishing media : Alcohol-resistant foam
Carbon dioxide (CO₂)
Dry chemical
Cool closed containers exposed to fire with water spray.
- Extinguishing media which shall not be used for safety reasons : Do not use a solid water stream as it may scatter and spread fire.
- Specific hazards during fire fighting : Extremely flammable.
Vapours may form explosive mixtures with air.

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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 (NO_x), dense black smoke.
Hydrogen cyanide (hydrocyanic acid)
Ammonia

Special protective equipment for fire-fighters : 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.
Discharge into the environment must be avoided.
Do not flush into surface water or sanitary sewer system.
Prevent product from entering drains.
Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
- 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.

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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 vapor 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.

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- 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/1documents/Committees/ERP-erpglevels.pdf>.

Exposure Guidelines

Tetrahydrofuran	109-99-9	ACGIH	TWA	50 ppm
			Skin designation: Can be absorbed through the skin.	
		ACGIH	STEL	100 ppm
		NIOSH	REL	200 ppm 590 mg/m3
		NIOSH	STEL	250 ppm 735 mg/m3
		OSHA Z1	PEL	200 ppm 590 mg/m3
		OSHA Z1A	TWA	200 ppm 590 mg/m3
		OSHA Z1A	STEL	250 ppm 735 mg/m3
		US CA OEL	TWA PEL	200 ppm 590 mg/m3
		US CA OEL	STEL	250 ppm 735 mg/m3
Acetic anhydride	108-24-7	ACGIH	TWA	5 ppm

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		NIOSH	Ceil_Time	5 ppm	20 mg/m3
		OSHA Z1	PEL	5 ppm	20 mg/m3
		OSHA Z1A	Ceiling	5 ppm	20 mg/m3
		US CA OEL	Ceiling	5 ppm	20 mg/m3
Pyridine	110-86-1	ACGIH	TWA		1 ppm
		NIOSH	REL	5 ppm	15 mg/m3
		OSHA Z1	PEL	5 ppm	15 mg/m3
		OSHA Z1A	TWA	5 ppm	15 mg/m3
		US CA OEL	TWA PEL	5 ppm	15 mg/m3

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form	: liquid, clear
Color	: colourless
Odor	: ether-like
pH	: not determined
Melting point/range	: -108.5 °C (-163.3 °F) The physical data is that of the main component.
Boiling point/boiling range	: 66 °C (151 °F) The physical data is that of the main component.
Vapor pressure	: 189 hPa at 20 °C (68 °F) The physical data is that of the main component.
Density	: 0.888 g/cm3 at 20 °C (68 °F)The physical data is that of the main component.
Water solubility	: completely soluble

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid	: Heat, flames and sparks.
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	<p>Keep away from direct sunlight. Protect from exposure to air/oxygen (peroxide formation). Protect against light. Protect against water.</p>
Materials to avoid	<p>: 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</p>
Hazardous decomposition products	<p>: Peroxides In case of fire hazardous decomposition products may be produced such as: Carbon dioxide (CO₂), carbon monoxide (CO), oxides of nitrogen (NO_x), dense black smoke. Hydrogen cyanide (hydrocyanic acid) Ammonia</p>
Hazardous reactions	<p>: Hazardous polymerisation does not occur. Stable under recommended storage conditions.</p>

SECTION 11. TOXICOLOGICAL INFORMATION

Acute oral toxicity	: LD50 rat Dose: 1,650 mg/kg Test substance: Tetrahydrofuran
Acute oral toxicity	: LD50 rat Dose: 1,780 mg/kg Test substance: Acetic anhydride
Acute oral toxicity	: LD50 rat Dose: 891 mg/kg Test substance: Pyridine
Acute dermal toxicity	: LD50 rabbit Dose: 4,332 mg/kg Test substance: Acetic anhydride
Acute dermal toxicity	: LD50 rabbit Dose: 1,121 mg/kg Test substance: Pyridine

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Acute inhalation toxicity	:	LC50 rat Dose: 21000 ppm Exposure time: 3 h Test substance: Tetrahydrofuran
Acute inhalation toxicity	:	LC0 rat Dose: 4.18 mg/l Exposure time: 4 h Test substance: Acetic anhydride
Acute inhalation toxicity	:	LC100 rat Dose: 8.36 mg/l Exposure time: 4 h Test substance: Acetic anhydride
Acute inhalation toxicity	:	LC50 rat Dose: 8796 ppm Exposure time: 1 h Test substance: Pyridine
Repeated dose toxicity	:	Inhalation rat Respiratory disorders, Lachrymation, Shortness of breath, Fatality Dose: Intermittent – 40 ppm or 167.2 mg/m ³ Exposure time: 2 Weeks Test substance: Acetic anhydride
Genotoxicity in vitro	:	Ames test negative Test substance: Acetic anhydride
Genotoxicity in vivo	:	Species: mouse Cell type: Micronucleus Test substance: Acetic anhydride negative
Additional advice	:	Confirmed animal carcinogen with unknown relevance to humans.

SECTION 12. ECOLOGICAL INFORMATION

Toxicity to fish	:	LC50 Species: Fathead minnow Dose: 2,160 mg/l Exposure time: 96 h Test substance: Tetrahydrofuran
Toxicity to fish	:	LC50

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		Species: Leuciscus idus (Golden orfe) Dose: 2,820 mg/l Test substance: Tetrahydrofuran
Toxicity to fish	:	LC50 Species: Leuciscus idus (Golden orfe) Dose: 265 mg/l Exposure time: 48 h Test substance: Acetic anhydride
Toxicity to fish	:	flow-through test LC50 Species: Fathead minnow Dose: 106 mg/l Exposure time: 96 h Test substance: Pyridine
Toxicity to daphnia and other aquatic invertebrates.	:	LC50 Species: Daphnia magna (Water flea) Dose: 55 mg/l Exposure time: 24 h Test substance: Acetic anhydride
Toxicity to algae	:	Cell multiplication inhibition test Species: Scenedesmus quadricauda Dose: 3,400 mg/l Exposure time: 8 d Test substance: Acetic anhydride
Toxicity to bacteria	:	LC50 Species: Bacteria Dose: > 580 mg/l Exposure time: 16 h Test substance: Tetrahydrofuran

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Information: Observe all Federal, State, and Local Environmental regulations.

SECTION 14. TRANSPORT INFORMATION

DOT	UN-Number	:	2924
	Proper shipping name	:	Flammable liquid, corrosive, n.o.s. (Tetrahydrofuran , Acetic anhydride , Pyridine)

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Class	3
Packing group	II
Hazard Label	3 (8)

IATA	UN Number	: 2924
	Description of the goods	: Flammable liquid, corrosive, n.o.s. (Tetrahydrofuran, Acetic anhydride , Pyridine)
	Class	: 3
	Packaging group	: II
	Hazard Label	: 3 (8)
	Packing instruction (cargo aircraft)	: 307
	Packing instruction (passenger aircraft)	: 305
	Packing instruction (passenger aircraft)	: Y305

IMDG	Substance No.	: UN 2924
	Description of the goods	: Flammable liquid, corrosive, n.o.s. (TETRAHYDROFURAN , ACETIC ANHYDRIDE , PYRIDINE)
	Class	: 3
	Packaging group	: II
	Hazard Label	: 3 (8)
	EmS Number	: F-E
	Marine pollutant	: no

SECTION 15. REGULATORY INFORMATION
Inventories

EU. EINECS : On the inventory, or in compliance with the inventory

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 list.

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(Can. Gaz. Part II, Vol. 133)

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

Switzerland. Consolidated Inventory : 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 Administration (DEA) Listed Precursor and Essential Chemicals (21 CFR 1310) : On the United States Drug Enforcement Authority (DEA) List of Precursors and Essential Chemicals

: Acetic anhydride 108-24-7

SARA 313 Components : Pyridine 110-86-1

SARA 311/312 Hazards : Fire Hazard
 Acute Health Hazard
 Chronic Health Hazard
 Reactivity Hazard

CERCLA Reportable Quantity : 1250 lbs

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California Prop. 65	: WARNING! This product contains a chemical known in the State of California to cause cancer. Pyridine	110-86-1
Massachusetts RTK	: Tetrahydrofuran : Acetic anhydride : Pyridine	109-99-9 108-24-7 110-86-1
New Jersey RTK	: Tetrahydrofuran : Acetic anhydride : Pyridine	109-99-9 108-24-7 110-86-1
Pennsylvania RTK	: Tetrahydrofuran : Acetic anhydride : Pyridine	109-99-9 108-24-7 110-86-1
WHMIS Classification	: B2 B6 E	

SECTION 16. OTHER INFORMATION

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

Further information

* - Chronic health hazard