

MATERIAL SAFETY DATA SHEET**Trade Name: Cap A (89)****Section I - Chemical Products & Company Identification**

Proligo LLC	Proligo Biochemie GmbH	Creation Date: 2/99
6200 Lookout Rd	Georg-Heyken-Str. 14	Revision Date: 3/04
Boulder, Colorado 80301 USA	Hamburg, Germany D21147	Revision Number: 1

Product #: L040250, L040400, L043000, L840020, L840045

For emergency source information (USA) contact: Chemtrec 1-800-424-9300 24 Hours

For emergency source information (International) contact: Chemtrec 001-703-527-3887 (USA) 24 Hours

Trade Names/Synonyms: Cap A/DNA Synthesis ReagentChemical Family: Nucleotide Synthesis Reagent Mixture**Section 2 - Composition/Information On Ingredients - % by Weight**

<u>Chemicals:</u>	<u>Composition (w/w) %:</u>	<u>CAS Number:</u>	<u>Classification:</u>	<u>Odor Threshold:</u>
Tetrahydrofuran	50-100%	109-99-9	F; R: 11-19 Xi; R: 36/37	20-50 ppm
Acetic Anhydride	10-25%	108-24-7	F; R: 10 C; R:34	0.14 ppm

Section 3 - Hazards IdentificationNFPA (National Fire Protection Association) Ratings (Scale 0-4): **Health: 2** **Flammable: 3** **Reactivity: 1**

Emergency Overview: Irritating to the eyes and respiratory system. The toxicological properties of this material have not been thoroughly investigated as a mixture. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Use prudent laboratory practices for handling chemical substances. Keep substance away from sources of ignition-No Smoking. Highly flammable (EU). May form explosive peroxides. Take precautionary measures against static discharges.

Potential Health Effects:

Skin Contact:	Short Term Exposure:	Irritant
	Long Term Exposure:	May be harmful, causes defatting and dermatitis.
Eye Contact:	Short Term Exposure:	Irritant
	Long Term Exposure:	May be harmful
Ingestion:	Short Term Exposure:	Irritant, can cause narcotic effects, coughing, chest pains, difficulty breathing, nausea, dizziness, headache, and unconsciousness.
	Long Term Exposure:	Maybe harmful to the liver, kidneys, and central nervous system.
Inhalation:	Short Term Exposure:	Irritant, can cause narcotic effects, coughing, chest pains, difficulty breathing, nausea, dizziness, headache, and unconsciousness.
	Long Term Exposure:	Maybe harmful to the respiratory system.
Injection:	Short Term Exposure:	No information available
	Long Term Exposure:	No information available

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	Tetrahydrofuran	Acetic Anhydride
OSHA:	Not Listed	Not Listed
NTP:	Not Listed	Not Listed
IARC:	Not Listed	Not Listed

According to 91/155 EC:

Hazard designation:

Xi Irritant

F Highly flammable

Information pertaining to particular dangers for man and environment

R 11 Highly Flammable

R 19 May form explosive peroxides

R 37/38 Irritating to respiratory system and skin

R 41 Risk of serious damage to eyes

***Classification system**

The classification is in line with current EC lists. It is expanded, however, by information from technical literature and by information furnished by supplier companies

Section 4: First Aid Measures

Skin Contact: Remove contaminated clothing. Flush affected area with water and then wash with soap or mild detergent and water. Observe for signs of irritation. If irritation is present, get medical attention.

Eye Contact: Wash eyes with large amounts of water or normal saline for at least 15 minutes. Observe for signs of irritation. If irritation is present, get medical attention.

Ingestion: Get medical attention.

Inhalation: Remove from exposure area to fresh air immediately. Get medical attention immediately.

Injection: If accidentally injected, get medical attention.

Note to Physician: There is no specific antidote. Treat symptomatically and supportively.

Section 5: Fire Fighting Measures

FIRE AND EXPLOSION HAZARD: Flammable and irritating liquid. Can form heat-sensitive peroxides, which could explode during concentration or evaporation. **Explosion Limits:** LEL 2% and UEL 11.8% for Tetrahydrofuran. **Explosion Limits:** LEL 2.7% and UEL 10.3% for Acetic Anhydride.

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical powder or appropriate foam. Water may be effective for cooling, but may not effect extinguishment.

SPECIFIC HAZARDS: Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions. Forms explosive mixtures with air. Emits toxic fumes under fire conditions.

PROTECTION OF FIREFIGHTERS: **Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Use water spray to cool fire-exposed containers.**

Section 6: Accidental Release Measures

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OCCUPATIONAL SPILL: Wear appropriate protective clothing and chemically compatible gloves. Remove all sources of ignition. Place spillage in appropriate container for waste disposal. Wash contaminated clothing before reuse. (See Section 8)

US CERCLA REPORTABLE QUANTITY (RQ): 1000 lbs. (RCRA code U213) for Tetrahydrofuran and 5000 lbs for Acetic Anhydride.

Section 7 - Handling and Storage

Observe all federal, state and local regulations. Do not breathe fumes. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Keep tightly closed. Store in cool dry place. Use prudent laboratory practices for handling and storage of chemical substances. Avoid sources of ignition.

Section 8 - Exposure Controls/Personal Protection

Exposure Controls: Use in laboratory hood or other ventilated device. Wear appropriate approved respirator where no engineering controls exist. Avoid contact with sources of ignition. Use non-sparking tools.

Eye Protection: Employees must wear splash-proof safety goggles to prevent eye contact with this substance.

Clothing: Employee must wear appropriate protective clothing (laboratory coat with long sleeves) and equipment to prevent skin contact with this material.

Gloves: Employee must wear appropriate protective gloves (Nitrile Gloves, 0.33 mm Thickness) to prevent contact with this material.

Permissible Exposure Limits (USA):

	Tetrahydrofuran	Acetic Anhydride
<u>ACGIH TWA (ppm)</u>	200	5
<u>ACGIH STEL/C (ppm)</u>	250	N/A
<u>IDHL (ppm)</u>	2000 [10% LEL]	200
<u>OSHA (ppm)</u>	200	5
<u>NIOSH (ppm)</u>	200	5

Permissible Exposure Limits (Europe):

	Tetrahydrofuran	Acetic Anhydride
<u>Germany (ppm)</u>	200	5 (ceiling value)
<u>USSR-UNEP/IRPTC (MAC)</u>	100 mg/ m ³ (work place air)	0.03 mg/ m ³ (average residential air)
<u>U. K. TWA (ppm)</u>	200	N/A
<u>U. K. STEL (ppm)</u>	N/A	5

According to 91/155 EC:

Components with limit values that require monitoring at the workplace:

Tetrahydrofuran (CAS # 109-99-9) 50-100%

OEL: Short-term value: 735 mg/m³, 250 ml/ m³

Long-term value: 590 mg/m³, 200 ml/ m³

Acetic Anhydride (CAS # 108-24-7) 10-25%

OEL: Short-term value: 20 mg/m³, 5 ml/ m³

Long-term value: 20 mg/m³, 5 ml/ m³

*Additional information about design of technical systems:
No further data; see item 7

Section 9 - Physical and Chemical Properties

DESCRIPTION: Liquid, Colorless, with pungent odor

SOLUBILITY: Miscible with organic solvents and water (the mixture)

FLASHPOINT: -14.4°C(6.08°F)(for Tetrahydrofuran) and 48.9°C(120°F)(for Acetic Anhydride)

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BOILING POINT:	65°C (149°F) AT 1000 mBar (for Tetrahydrofuran) and 138.9°C(282°F) (for Acetic Anhydride)
MELTING POINT:	-73°C(-99.4°F) (for Acetic Anhydride)
FREEZING POINT:	< -20.0°C(<-4°F) (for Tetrahydrofuran)and -72.8°C(-99°F) (for Acetic Anhydride)
VAPOR PRESSURE:	190 mBar at 15.0°C(59°F) (for Tetrahydrofuran) and 4 mm (for Acetic Anhydride)
VAPOR DENSITY:	2.5 (Tetrahydrofuran, air = 1)
pH:	pH 3 at 100 g/L in water(20°C, 68°F)
Danger of Explosion:	May form explosive peroxides
Self-inflammability:	Product is not selfigniting
Solvent Content:	0% Water

Section 10 - Stability and Reactivity

STABILITY:	Stable at room temperature.
REACTIVITY:	Incompatible with bases, slow degradation in water. Acetic anhydride reacts with water to acetic acid.
CONDITIONS TO AVOID:	Incompatible with bases, strong oxidizers, lithium-aluminum alloys, chromic acid, strong caustics, and amines. Exposure to a heat source. Peroxides may accumulate upon prolonged storage in presence of air. Acetic anhydride is corrosive to iron, steel, and other metals.
INCOMPATIBILITIES:	Forms explosive mixture with air. Unless inhibited, can form unstable and explosive peroxides. Incompatible with strong acids, strong oxidizers. Attacks some plastics. May accumulate static electric charges that can result in ignition of its vapors.
DECOMPOSITION PRODUCTS:	May include toxic oxides of carbon and nitrogen.
POLYMERIZATION:	Not available

Section 11 - Toxicology Information

TOXICITY:	The toxicological properties of this material have not been investigated as a mixture. <u>Tetrahydrofuran:</u> LD ₅₀ Oral (Rat)=2816 mg/ kg LC ₅₀ Inhalation (Rat)=21000 ppm/ 3 hours. Human lethal dose 50-500 mg/kg. <u>Acetic anhydride:</u> LD ₅₀ Oral (Rat)=1780 mg/ kg LC ₅₀ Inhalation (Rat)=1000 ppm/ 4 hours.
CARCINOGEN STATUS:	No information available
LOCAL EFFECTS:	See Section 3 for health effects.
TARGET EFFECTS:	Eyes, liver (fatty liver degeneration) respiratory system, and central nervous system (CNS)
AT INCREASED RISK FROM EXPOSURE:	Effects on fertility may cause post-implantation mortality.
Chemical Name:	RTECS Number:
Tetrahydrofuran	LU5950000
Acetic Anhydride	AK1925000

According to 91/155 EC:

Contains larger amounts of solvent, which may cause narcotic effects, headache, unconsciousness, dizziness, lack of concentration, weakness, difficulty breathing, coughing or nausea.

*Additional toxicological information:

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The product shows the following dangers according to the calculation method of the General EC Classification Guidelines for Preparations as issued in the latest version;

Irritant

Section 12 - Ecological Information

ENVIRONMENTAL IMPACT RATING (0-4):	No data available.
ACUTE AQUATIC TOXICITY:	<u>Tetrahydrofuran:</u> EPA: 8,100 µg/L (no set criteria, permissible ambient goal) USSR-UNEP/IRPTC (MAC): 0.5 mg/L <u>Acetic Anhydride:</u> no criteria set
DEGRADABILITY:	No data available.
LOG BIOCONCENTRATION FACTOR (BCF):	No data available.

Section 13 - Disposal Information

Observe all Federal, State, and Local Regulations.

According to 91/155 EC:

Product:

Recommendation: Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

Uncleaned packaging:

Recommendation: disposal must be made according to official regulations.

Recommended cleaning agent: Water, if necessary with cleaning agent

Before cleaning use up or empty container completely.

Section 14 - Transportation Information

Ship as regulated material. Transportation restrictions apply. The acute toxicity profile does warrant shipment as a hazardous material (DOT) or a dangerous good (IATA).

UN2924

Hazard Class 3

Subsidiary Risk 8

Label Requirements: Flammable liquid, corrosive, n.o.s. (Tetrahydrofuran and Acetic Anhydride)

According to 91/155 EC:

Land transport ADR/RID(cross-border)

- ADR/RID-GGVS/E Class: 3 Inflammable liquids
- Number/Letter: 26b
- Kemler Number: 338
- UN-Number: 2924
- Label: 3+8
- Designation of goods: Flammable liquid, corrosive, n.o.s., tetrahydrofuran, acetic anhydride

Maritime transport IMDG:

- IMDG Class: 3.2
- Page: 3231

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R: 41

Risk of serious damage to eyes

Safety Phrases: Mixture

S:16

Keep away from sources of ignition- No Smoking.

S:26

In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S:33

Take precautionary measures against static discharges.

For Laboratory R&D Use Only.

According to 91/155 EC:

National Regulations

Classification according to VbF: B

Technical instructions (air):

Class Share in %: II 50-100

Section 16 - Other

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