

Stock solutions of Morpholino oligos		
Amount of Morpholino (Amount of Vivo-Morpholino)	Volume of sterile water	Resulting stock concentration
100 nanomoles	0.10 mL	1.0 milliMolar (mM)
(100 nanomoles Vivo-MO)	0.20 mL	0.5 milliMolar (mM)
300 nanomoles	0.30 mL	1.0 milliMolar (mM)
(400 nanomoles Vivo-MO)	0.80 mL	0.5 milliMolar (mM)
1000 nanomoles	1.00 mL	1.0 milliMolar (mM)
(2000 nanomoles Vivo-MO)	4.00 mL	0.5 milliMolar (mM)

Oligo Concentrations

Typical effective concentrations of standard Morpholino oligos in various systems:

Test system	Oligo concentration
Electroporation in cultures	1 μ M to 10 μ M (in delivery solution)
Endo-Porter ^(a) in cultures	1 μ M to 10 μ M (in medium)
Scrape-loading ^(b) in cultures	1 μ M to 20 μ M (in medium)
Microinjection into oocytes	Inject 1 to 10 nanoliters of 1 mM oligo into 1 μ l oocyte to give 1 to 10 μ M final concentration in oocyte
Cell-free translation system ^(c)	100 nM to 1000 nM (in lysate)

(a) Endo-Porter solution delivers Morpholino oligos into the cytosol of cells efficiently and uniformly by releasing oligos from endosomes.

(b) Morpholino oligos may be loaded into the cytosol/nuclear compartment of adherent cells by adding oligo to the medium and then scraping the cells from the plate (see: Antisense and Nucleic Acid Drug Dev. **6**, 166 (1996)).

(c) See: Antisense and Nucleic Acid Drug Dev. **7**, 63 (1997)

Typical effective concentrations of Vivo-Morpholino oligos in various systems:

Test system	Oligo concentration and/or dose
Cell bathing in cultures	1-10 μ M in nutrient medium
Injection into mouse tail vein	12.5 (mg oligo)/(kg mouse) per day
Injection into mouse intraperitoneal	12.5 (mg oligo)/(kg mouse) per day

Cell Delivery Protocols

Upon request GENE TOOLS will provide protocols for Endo-Porter or scrape delivery with cell scrapers. Copies of these protocols are normally shipped with orders which include these products.

QUANTITY

Standard Morpholino oligos

Typical package size for a classic Morpholino oligo is:

300 nanomoles (about 2.5 mg or 75 OD units for 25-mer).

Larger amounts available (1000 nanomole, 6000 nanomole, 1g, etc.).

Vivo-Morpholino oligos

Typical package size for a Vivo-Morpholino oligo is:

400 nanomoles (about 4 mg or 100 OD units for 25-mer).

Larger amounts available (2000 nanomole, 10000 nanomole, 1g, etc.).

Note: The quantities above are the measured and delivered amounts of lyophilized, sterile Morpholino oligos.

GENE TOOLS PREPARED CONTROLS

Standard Control

Sequence:

5' CCTCTTACCTCAGTTACAATTTATA 3'

Calculated Mass: 8328

Molar Absorbance

@265 nm in 0.1 N HCl: 259,160 1/(M*cm)

Quantity Delivered: 100 nanomoles

25.9 OD_{265, pH1} Units

0.833 mg

Fluoresceinated Standard Control

Sequence:

5' CCTCTTACCTCAGTTACAATTTATA 3'

Calculated Mass: 8817

Molar Absorbance

@265 nm in 0.1 N HCl: 259,160 1/(M*cm)

Quantity Delivered: 100 nanomoles

25.9 OD_{265, pH1} Units

0.882 mg

Lissaminated Standard Control

Sequence:

5' CCTCTTACCTCAGTTACAATTTATA 3'

Calculated Mass: 9112

Molar Absorbance

@265 nm in 0.1 N HCl: 259,160 1/(M*cm)

Quantity Delivered: 100 nanomoles

25.9 OD_{265, pH1} Units

0.911 mg

Vivo Standard Control

Sequence:

5' CCTCTTACCTCAGTTACAATTTATA 3'

Calculated Mass: 10,138

Molar Absorbance

@265 nm in 0.1 N HCl: 259,160 1/(M/cm)

Quantity Delivered: 100 nanomoles

25.9 OD_{265, pH1} Units

1.01 mg

Gene Tools Blue Standard Control

Sequence:

5' CCTCTTACCTCAGTTACAATTTATA 3'

Calculated Mass: 9078

Molar Absorbance

@265 nm in 0.1 N HCl: 259,160 1/(M*cm)

Quantity Delivered: 100 nanomoles

25.9 OD_{265, pH1} Units

0.908 mg

Random Control 25-N

Sequence:

5' NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN 3'

Calculated Mass: 8463 average mix of 25-mer

Molar Absorbance

@265 nm in 0.1 N HCl: 259,063 1/(M*cm)_{avg}

Quantity Delivered: 100 nanomoles

25.9 OD_{265, pH1} Units

0.846 mg (average)

Zebrafish p53

Sequence:

5' GCGCCATTGCTTTGCAAGAATTG 3'

Calculated Mass: 7805

Molar Absorbance

@265 nm in 0.1 N HCl: 236,990 1/(M*cm)

Quantity Delivered: 100 nanomoles

23.7 OD_{265, pH1} Units

0.780 mg

Zebrafish Chordin (3'Fluorescein)

Sequence:

5' ATCCACAGCAGCCCCTCCATCATCC 3'

Calculated Mass: 8742

Molar Absorbance

@265 nm in 0.1 N HCl: 250,880 1/(M*cm)

Quantity Delivered: 100 nanomoles

25.1 OD_{265, pH1} Units

0.876 mg

Clawed Frog p53

Sequence:

5' GCCGGTCTCAGAGGAAGGTTCCATT 3'

Calculated Mass: 8500

Molar Absorbance

@265 nm in 0.1 N HCl: 256,200 1/(M*cm)

Quantity Delivered: 100 nanomoles

25.6 OD_{265, pH1} Units

0.850 mg

Clawed Frog Beta-Catenin ^(3'Fluorescein)

Sequence:

5' TTTCAACCGTTTCCAAGAACCAGG 3'

Calculated Mass: 8901

Molar Absorbance

@265 nm in 0.1 N HCl: 262,740 1/(M*cm)

Quantity Delivered: 100 nanomoles

24.3 OD_{265, pH1} Units

0.890 mg

Green Fluorescent Protein Positive Ctrl

Sequence:

5' ACAGCTCCTCGCCCTTGCTCACCAT 3'

Calculated Mass: 8275

Molar Absorbance

@265 nm in 0.1 N HCl: 246,420 1/(M*cm)

Quantity Delivered: 100 nanomoles

24.6 OD_{265, pH1} Units

0.828 mg

Vivo GFP Positive Control

Sequence:

5' ACAGCTCCTCGCCCTTGCTCACCAT 3'

Calculated Mass: 10,085

Molar Absorbance

@265 nm in 0.1 N HCl: 246,420 1/(M*cm)

Quantity Delivered: 100 nanomoles

24.6 OD_{265, pH1} Units

1.01 mg

Photo GFP Positive Control

Sequence:

5' ACAGCTCCTCaaPaaTGCTCACCAT 3'

Calculated Mass: 8237

Molar Absorbance

@265 nm in 0.1 N HCl: 255,910 1/(M*cm)

Quantity Delivered: 100 nanomoles

25.6 OD_{265, pH1} Units

0.824 mg

Gal4-UAS Photo Morpholino Antisense

Sequence:

5' GTTCGATAGAtaPatGTAGCTTCAT 3'

Calculated Mass: 8393

Molar Absorbance

@265 nm in 0.1 N HCl: 259,160 1/(M*cm)

Quantity Delivered: 100 nanomoles

25.9 OD_{265, pH1} Units

0.839 mg

Gal4-UAS Photo Morpholino Sense

Sequence:

5' ATGAAGCTACaaPaaTCTATCGAAC 3'

Calculated Mass: 8349

Molar Absorbance

@265 nm in 0.1 N HCl: 268,450 1/(M*cm)

Quantity Delivered: 100 nanomoles

25.95 OD_{265, pH1} Units

0.835 mg

Gal4-UAS

Sequence:

5' GTTCGATAGAAGACAGTAGCTTCAT 3'

Calculated Mass: 8507

Molar Absorbance

@265 nm in 0.1 N HCl: 266,090 1/(M*cm)

Quantity Delivered: 100 nanomoles

26.6 OD_{265, pH1} Units

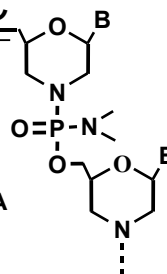
0.851 mg

Material Safety Data Sheet

Morpholino Phosphorodiamidate Oligomer
Revision Date: Apr 2002

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Section I: Product Identification

Product Name: Morpholino Oligos
Chemical Name: Morpholino Phosphorodiamidate Oligomer
Chemical Formula: N/A
CASS #: None assigned

Section II: Hazardous Ingredients

Hazardous Components: None

Section III: Physical/Chemical Characteristics

Physical State: White Lyophilized Powder
Odor: None
Boiling Point: Does not boil
Vapor Pressure: Negligible
Vapor Density: N/A
Solubility: Soluble in water
Specific Gravity: Not determined
Melting Point: Does not melt
Evaporation Rate: Negligible

Section IV: Fire and Explosion Hazard Data

Flash Point: No information available
Unusual Fire or Explosion Hazards: None
Extinguishing Media: Fire-Fighting Instructions: Use water

Section V: Reactivity Data

Chemical Stability: Stable under normal temperatures and pressures
Incompatibility: Strong acids cause non-hazardous degradation of product
Conditions to Avoid: None reported
Hazardous Polymerization: Will not occur

Section VI: Health Hazard Data

Routes of Entry: May enter the body through ingestion, inhalation, skin and eye contact
Carcinogenicity: No information available
Toxicity: Intravenous injection of up to 800 mg/kg in mice causes no acute toxicity
Health Hazards: Preliminary studies suggest this product is not a health hazard
Signs and Symptoms of Exposure: Unknown, handle with care
Emergency and First Aid Procedures: None required

Section VII: Precautions for Safe Handling and Storage

Storage Precautions: Store at or below room temperature
Steps to be taken in case material is released or spilled: Wash area with soap and water
Waste Disposal Method: Observe all Federal, State and Local Environmental Regulations

Section VIII: Control Measures

Respiratory Protection: None required
Ventilation: General ventilation is sufficient
Personal Protective Equipment: None required
Work/Hygiene Practices: None required

The above information is correct to the best of our knowledge. This material is intended for research purposes only and must only be used under the supervision of a person experienced in handling hazardous materials. GENE TOOLS, LLC makes no guarantee of the accuracy or completeness of the information and shall not be held liable for any damage resulting from handling or from contact with the above material.

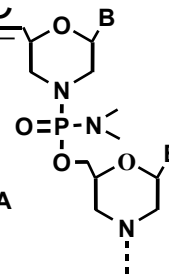
Morpholino Oligos are covered by European and United States Patents, including: 5,142,047 and 5,185,444.

Material Safety Data Sheet

Vivo-Morpholino Oligomer
Date Updated: 10 June 2016

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Section I: Product Identification

Product Name: Vivo-Morpholino Oligo
Chemical Name: Morpholino Phosphorodiamidate Oligomer Conjugated with *in vivo* Delivery Moiety
Chemical Formula: N/A
CAS #: None assigned

Section II: Hazardous Ingredients

Emergency Overview

Caution

The chemical, physical, and toxicological properties of this product have not been thoroughly investigated. Exercise due care.

HMIS Rating

Health	3
Flammability	0
Reactivity	0

NFPA Rating

Health	3
Flammability	0
Reactivity	0

Section III: First Aid Measures

Oral Exposure	If swallowed, wash out mouth with water provided person is conscious. Call a physician.
Inhalation Exposure	If inhaled, remove to fresh air. If breathing becomes difficult, call a physician.
Dermal Exposure	In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.
Eye Exposure	In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section IV: Fire Fighting Measures

Flash Point	Not available
Autoignition Temp	Not available
Flammability	Not available
Extinguishing Media Suitable	Carbon dioxide, dry chemical powder, or appropriate foam. Water spray
Fire Fighting Protective Equipment	Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s)	Emits toxic fumes under fire conditions.

Section V: Accidental Release Measures

Procedure to be Followed in Case of Leak or Spill	Evacuate area
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Procedure(s) of Personal Precaution(s)	Wear respirator, chemical safety goggles, rubber boots, and heavy rubber gloves
Methods for Cleaning up	Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section VI: Handling and Storage

Handling	
User Exposure	Avoid inhalation. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.
Storage	
Suitable	Keep tightly closed
Storage at or below room temperature	

Section VII: Exposure Controls/Personal Protection Equipment

Engineering Controls	Mechanical exhaust required
Personal Protective equipment	
Respiratory	Respiratory protection is not required. Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN 143) respirator.
Other	Wear appropriate government approved respirator, chemical-resistant gloves, safety goggles, other protective clothing.
General Hygiene Measures	Wash thoroughly after handling

Section VIII: Physical/Chemical Characteristics

Physical State:	Lyophilized solid
Odor:	None
Boiling Point:	Not determined
Vapor Pressure:	Not determined
Vapor Density:	N/A
Solubility:	Soluble in water
Specific Gravity:	Not determined
Evaporation Rate:	Negligible

Section IX: Stability and Reactivity

Stability	
Stable	stable
Hazardous Decomposition Products	
Hazardous Decomposition Products	Carbon monoxide, carbon dioxide, nitrogen oxides
Hazardous Polymerization	
Hazardous Polymerization	Will not occur

Section X: Toxicological Information

Route of Exposure	
Skin Contact	May cause skin irritation
Skin Absorption	May be harmful if absorbed through the skin
Inhalation	Material may be irritating to mucous membranes and upper respiratory tract, may be harmful if inhaled.

Ingestion
Conditions Aggravated by Exposure

May be harmful if swallowed
The toxicological properties have not been thoroughly investigated.

Section XI: Ecological Information

No data available.

Section XII: Disposal Considerations

Appropriate Method of Disposal of Substance or Preparation

Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section XIII: Transport Information

DOT

Proper Shipping Name
Non-Hazardous for Transport

None
This substance is considered to be non-hazardous for transport.

IATA

Non-Hazardous for Air Transport

Non-hazardous for air transport

Section XIV: Regulatory Information

US Classification and Label Text
US Statements

Caution: The chemical, physical, and toxicological properties of this product have not been thoroughly investigated. Exercise due care.

United States Regulatory information
SARA Listed
Canada Regulatory information
WHMIS Classification

No

This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL
NDSL

No

No

Section XV: Other Information

The above information is correct to the best of our knowledge. This material is intended for research purposes only and must only be used under the supervision of a person experienced in handling hazardous materials. GENE TOOLS, LLC makes no guarantee of the accuracy or completeness of the information and shall not be held liable for any damage resulting from handling or from contact with the above material.