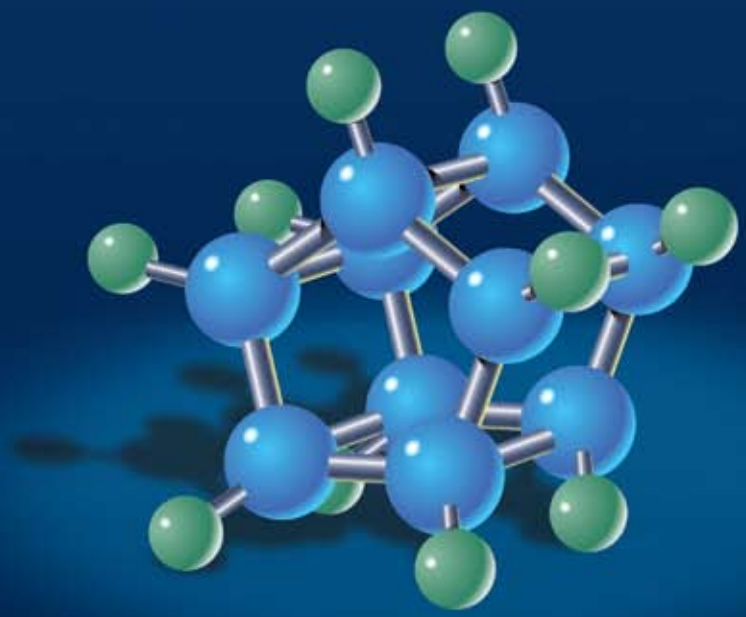
2008, Vol. 2.0

# ChemGenes CORPORATION

Experience Nucleic Acid Expertise

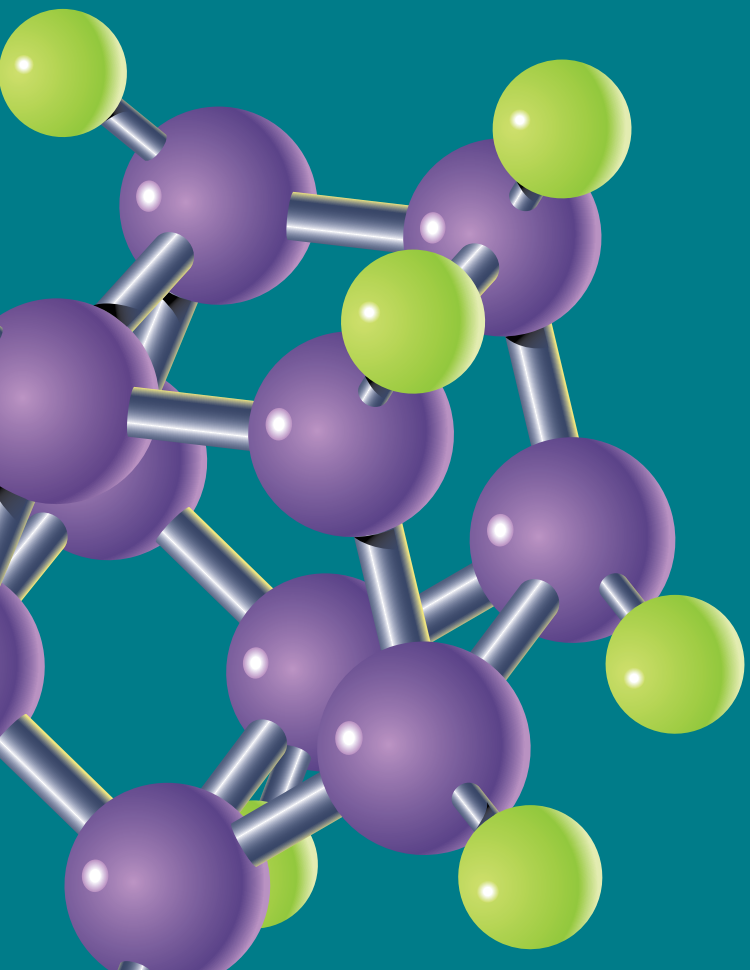


**ChemGenes has been in business for over 25 years and has recently moved into a state of the art facility in Wilmington, MA. ChemGenes has a full scale modernized lab with the facilities to manufacture in bulk while maintaining its high quality. We have added many new products to our original line to facilitate research in the area of biotechnology.**

As the market for oligonucleotides continues to grow, ChemGenes remains committed to introducing novel products, while maintaining its existing product mix. We also have the capacity to custom synthesize products on request.

**Our quality is guaranteed!** We want to assure you that every product is of the highest purity and conforms to the technical data sheet that accompanies it when shipped.

- ChemGenes takes pride in a long history of customer satisfaction in supplying phosphoramidites that have a purity of 98% or better for most phosphoramidites.
- Each lot of Phosphoramidite must pass an established testing criteria before it can be shipped to customers.



## Required QC Tests for Most Phosphoramidites

### Solubility test

- Amidites completely dissolve in Acetonitrile to make a 0.1M Solution (water<0.004-0.005gm/100ml). Leave no visible particulate matter.

### Coupling Efficiency

- The coupling efficiency of ChemGenes phosphoramidite products are 98% or better.

### HPLC

- Greater then 98.5% purity by HPLC.

### 31P NMR

- Doublet peak or single peak.
- Position of each peak is know for each phosphoramidite.
- The value between the peaks is calculated and recorded.

**UV –** The UV test provides 4 values of data:

- The ratio between 250/260 nm.
- The ratio between 260/280 nm.
- Emax position.
- Extinction Coefficient.

### MASS Spectrum

- Performed on each product in +ve and -ve mode.

### 1H NMR

- Proton NMR analysis is performed for each product.

### TLC

- Single or double spot with no other visibly impurity on spotting, 0.2mg/spot.
- Single spot or double spot depends on the phosphoramidite.

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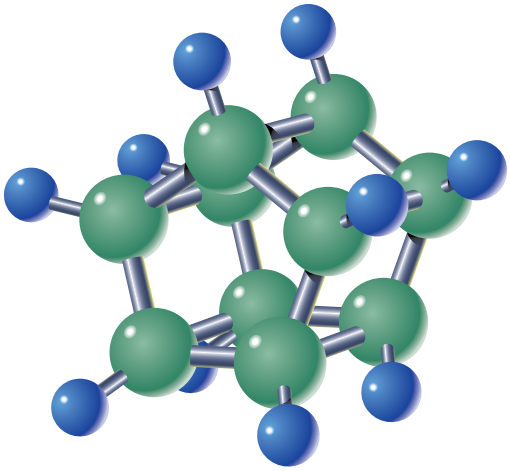
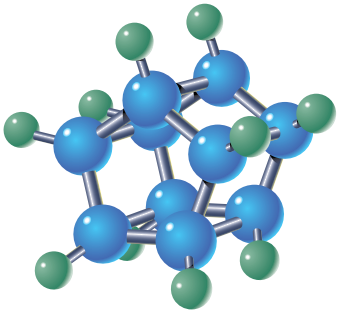




# Our Products

## Oligo Synthesis Reagents

Natural DNA Amidites & Supports

Ancillary Reagents

Modified DNA Amidites & Supports

Natural RNA Amidites & Supports

Amidites and Supports for Introducing Chromophores & Ligands

Amidites and Supports for 2′-O-Methyl Oligonucleotides

## Drying Traps

## Oligonucleotide Purification

## Nucleosides, Sugars, Purines, & NHS Esters

Unprotected mononucleosides

N-protected mononucleosides

DMT-protected mononucleosides

Phosphoramidite Chemistry Reagents

Sugars & Purines

NHS-Esters

## Trisphosphates

Modified Triphosphates

## Custom Synthesis

## New Featured Products

Universal Support
TOM Amidites
8-Methyl ribo Guanosine Amidite
8-Methyl deoxy Guanosine Amidite
Reverse RNA Synthesis
5′-O-Methyl DNA Amidite

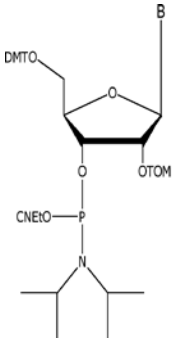
# TOM Phosphoramidites

## Key Advantages:

- **Superior Quality RNA** using 2′-O-TOM protection: No possibility of 2′-5′-linkage
- Perfected manufacturing process: **prices comparable to TBDMS**
- **Higher Coupling Efficiency** due to lower steric hindrance: Reduced Coupling Time (2-4 minutes)
- **No base modification or M + 30 observed** (through extensive chemical Ionization mass analysis)
- **High Quality Long Chain Oligos**

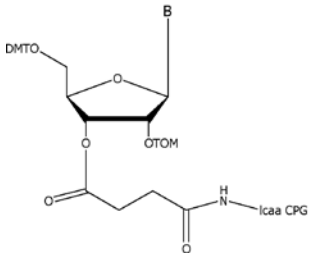
## Quality Guaranteed:

- Purity greater than 97% by HPLC.
- 31 P NMR purity ranges from 98 -100%
- UV Spectral data to conform to highest
- 1 H NMR data to conform
- Coupling efficiency greater than 98% per step
- Ideal for Long Chain Oligos
- TOM Amidites Produced under GMP guidelines




**Amidites**

| B | Protection | Catalog # |
|---|---|---|
| A | n-acetyl | **ANP-3201** |
| C | n-acetyl | **ANP-3202** |
| G | n-acetyl | **ANP-3203** |
| U | n/a | **ANP-3205** |




**Supports**

| B | Protection | Catalog # | Pore Size |
|---|---|---|---|
| A | n-acetyl | **N-32001-05** | 500A |
| | | **N-32001-10** | 100AA |
| C | n-acetyl | **N-32002-05** | 500A |
| | | **N-32002-10** | 1000A |
| G | n-acetyl | **N-32003-05** | 500A |
| | | **N-32002-10** | 1000A |
| U | n/a | **N-32005-05** | 500A |
| | | **N-32005-10** | 1000A |

## Also Available:

Low to high loading CPG supports with TOM-monomer for uniform deprotection of RNA's.

## Now Available Bulk Quantities Manufactured Under GMP Guidelines

Licensed from QIAGEN Inc. for therapeutic RNA market)

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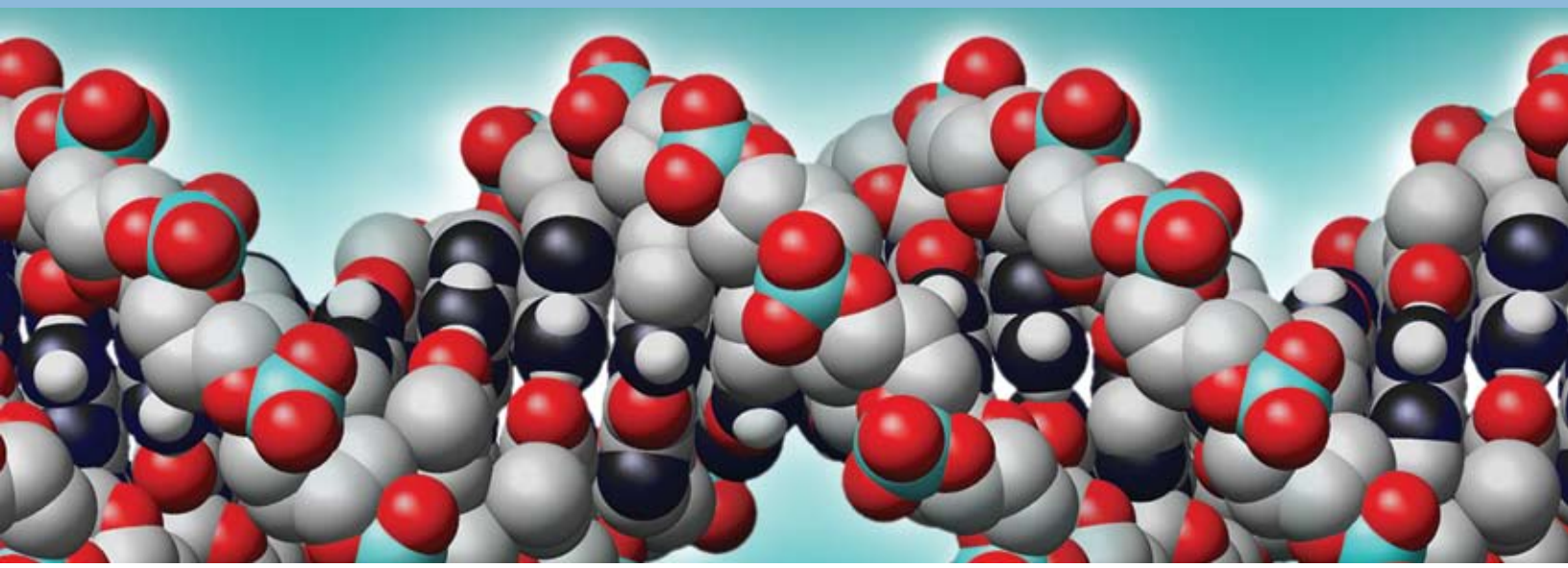
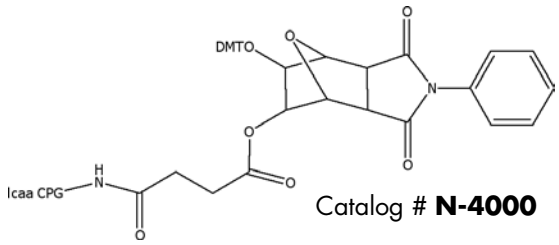
# Universal and Non-Cleavable Supports



## UnyLinker Universal Support for Synthesis of Oligonucleotides:

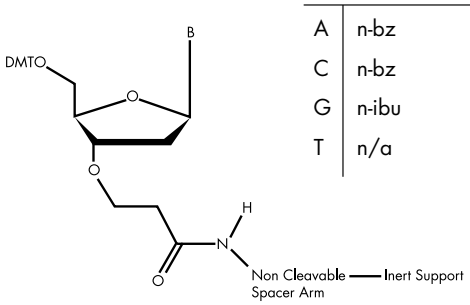
- Technology Licensed from Isis Pharmaceuticles
- CPG and Polystyrene supports
- Bulk supports and pre-packed columns Available




Catalog # **N-4000**

## Non Cleavable Supports & Columns:

- Non- Cleavable inert Supports & Columns
- Uniform Particle Size
- Long Chain Spacer on Rigid non-swellable Support
- Two particle sizes are available; 15-20 um & 60-70 um




| B | Protection | Catalog # |
|---|---|---|
| A | n-bz | **N-7521** |
| C | n-bz | **N-7522** |
| G | n-ibu | **N-7523** |
| T | n/a | **N-7524** |

## Key Features:

- Fully compatible with standard phosphoramidite reagents and synthesis conditions
- Has standard DMT group and requires standard deblock solutions for oligonucleotides synthesis
- Coupling efficiency greater than or equal to 99%
- Results in clean oligonucleotides
- Clean and standard succinate linkage and quantitative cleavage from support with ammonium incubation.

## Applications:

- High Coupling efficiency leads to pure oligos
- Combinatorial library screening
- High purity Long chain oligos (up to 55 –mer synthesized)
- PCR amplication of bead bound oligo is done efficiently

**One Bead One Aptamer Combinatorial Library Screening**

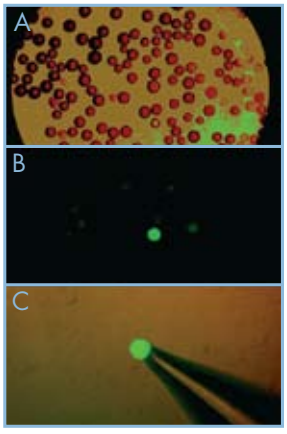
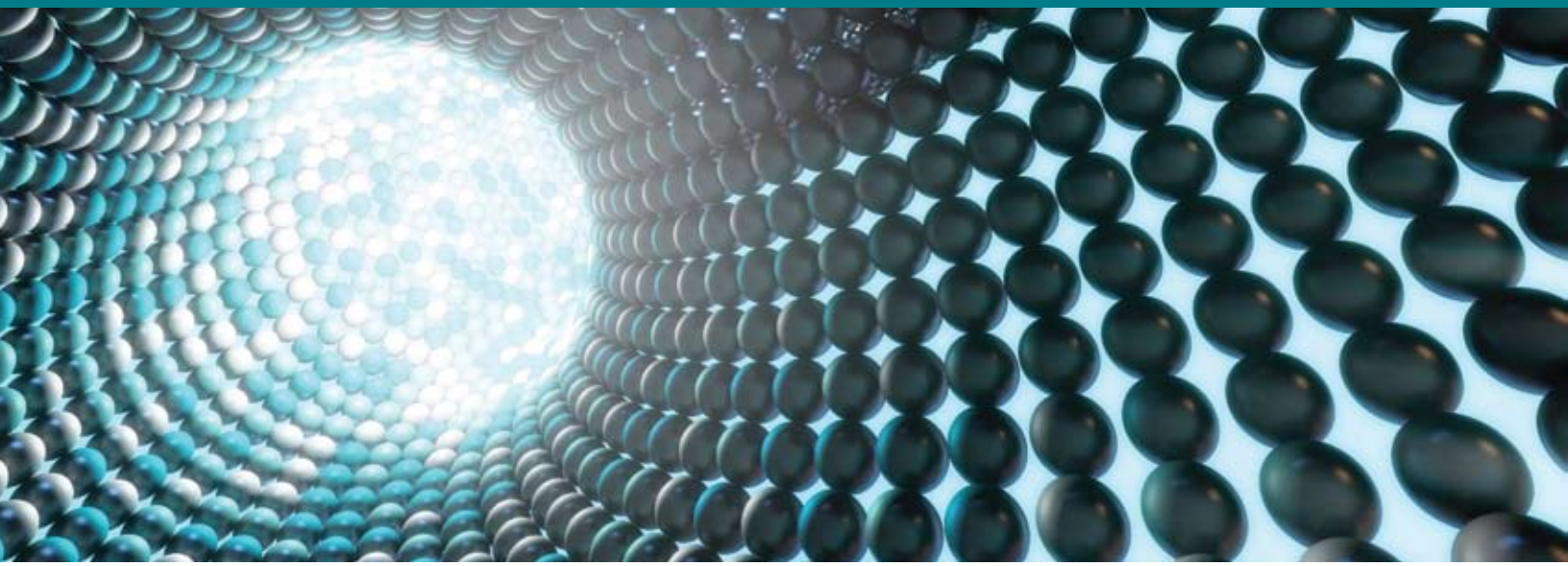



Photo taken by permission from Nucleic Acids Research

Xianbin Yang, Suzanne E. Bassett, Xin Li, Bruce A. Luxon, Norbert K. Herzog,Robert E. Shope, Judy Aronson, Tari W. Prow, James F. Leary, Romy Kirby, Andrew D. Ellington, and David G. Gorenstein, Nucleic Acid Research, 2002, vol 30, e 132

# 7-Deaza Products



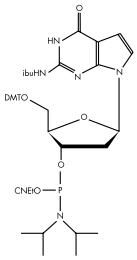
## 7- Deaza- Purine-Phosphoramidites:

7- Deaza-modification finds extensive application in molecular biology & design of oligos with 7- deaza-substitution, in place of multiple G's in the sequence.

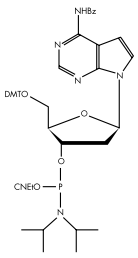
## Key Features:

- To avoid extensive secondary structure formation in oligos and thereby improve targeted hybridization more effectively.
- Antiparallel triple helix formation with double stranded DNA is favored with this modification.

## 7- Deaza-2'-deoxy A & G Phosphoramidites

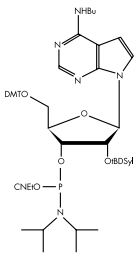


7-Deaza deoxy Adenosine CED OP
Catalog #: **ANP-4815**

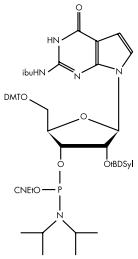


7-Deaza deoxy Guanosine CED OP
Catalog #: **ANP-4857**

## 7- Deaza-ribo A & G Phosphoramidites:



7-Deaza Adenosine CED OP
Catalog #: **ANP-7101**

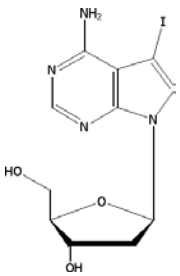


7-Deaza Guanosine CED OP
Catalog #: **ANP-7301**

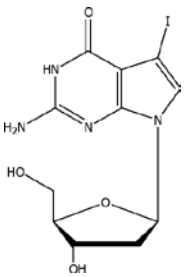
## 7- Deaza-7-iodo-dA and dG Nucleosides:

## Key Modifications:

- For C-7 conversion to C-7- Modified -7-deaza-dA & dG 7- Modified -7-deaza-5'-nucleoside Triphosphates
- Extensive application in molecular biology for diagnostics and sequencing.
- 7- position modifications do not interfere in either PCR or oligo hybridizations.
- The 7- deaza-nucleoside phosphates and triphosphates are currently used in DNA sequencing.



7-Deaza-7-Iodo deoxy Adenosine
Catalog #: **DN-2561**



7-Deaza-7-Iodo deoxy Guanosine
Catalog #: **DN-2563**

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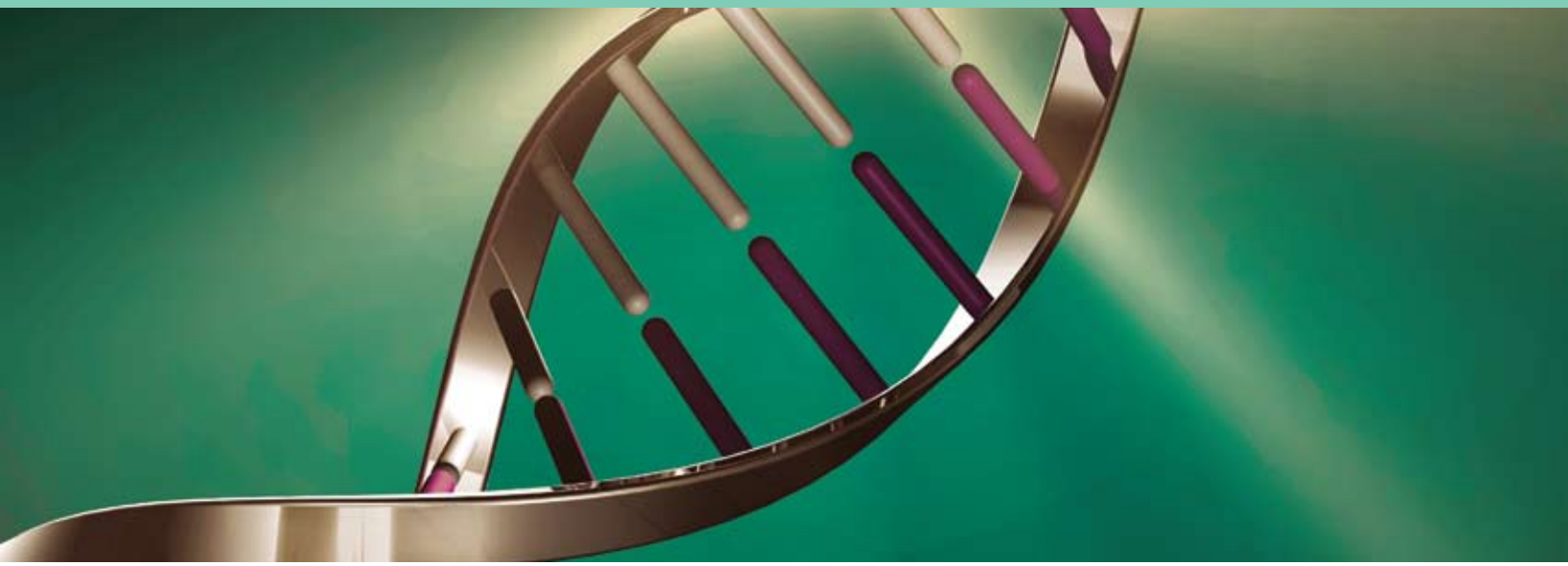
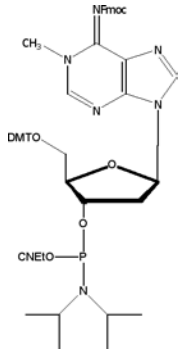
# N-Alkylated Phosphoramidites



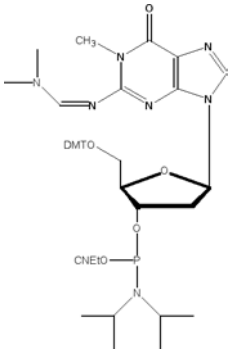
- Due to mutagenic effects of carcinogens, DNA in living organisms is vulnerable to alkylation.
- ChemGenes offers the phosphoramidites for studies of reversal of methylated lesions by use of oligonucleotides incorporating alkylated purine/pyrmidine.
- It has been shown that there is a direct reversal of n-alkylation of methylated bases in oligonucleotides.
- The discovery of an enzyme which is substrate for DNA repair has great implications for repair of such carcinogenic and mutagenic effects. (Ref. 1)

## Our featured products include:



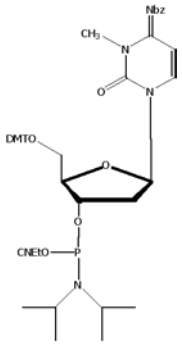

$N^1$-Methyl deoxy Adenosine Phosphoramidite

Catalog # **ANP-6121**



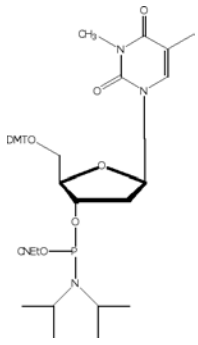

$N^1$-Methyl deoxy Guanosine Phosphoramidite

Catalog # **ANP-6122**




$N^3$-Methyl deoxy Cytidine Phosphoramidite

Catalog # **ANP-3851**

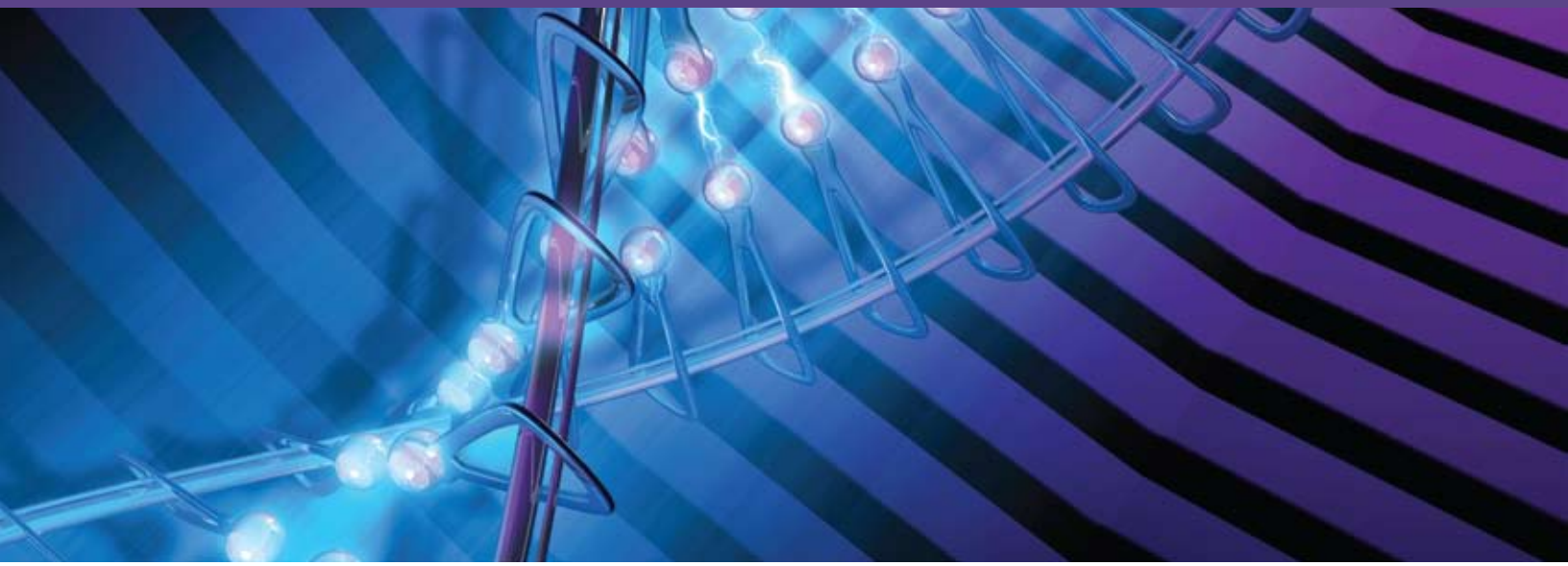



$N^3$-Methyl Thymidine Phosphoramidite

Catalog # **ANP-6153**

***Ref. 1:*** *(S.C. Trewick, T.F. Henshaw, R.P.Hausinger, T. Lindahl and B. Sedgwick, Nature, 419, 174-177, 2002; and another report confirming these observations, P.Falnes, R.F. Johansen, E. Seeberg, Nature 419, 178, 2002).*

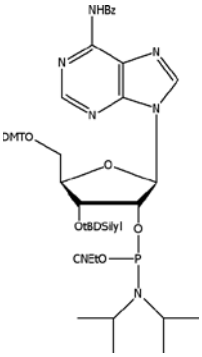
# 3′-tBDSilyl RNA Phosphoramidites



- Allows the synthesis of 2′-5′-linked oligos.
- RNA 2′,5′-duplexes are not substrates of the enzyme RNAse. However, they can inhibit the RNaseH mediated cleavage of a natural DNA: RNA substrate.

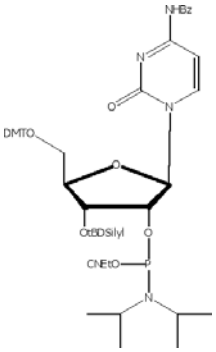
## Useful Applications

- Determine their exact biological role.
- Extend their biological half life.
- Alter the biological activity of the core structure.



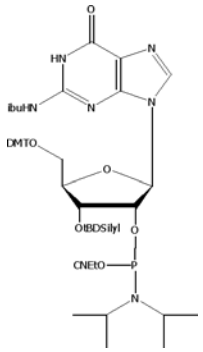

Adenosine (n-bz) 3′-tBDSilyl CED OP

Catalog #
**ANP-5681**



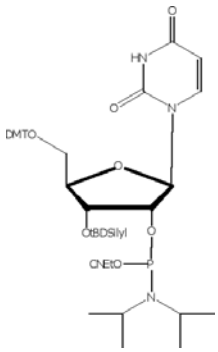

Cytidine (n-bz) 3′-tBDSilyl CED OP

Catalog #
**ANP-5682**




Guanosine (n-ibu) 3′-tBDSilyl CED OP

Catalog #
**ANP-5683**




Uridine 3′-tBDSilyl CED OP

Catalog #
**ANP-5684**

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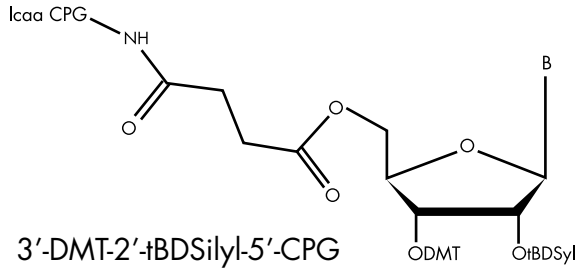
# RNA Synthesis – Reverse Direction

## Phosphoramidites for Reverse RNA Synthesis:

- **RNA synthesis in 5′ to 3′- direction**
- Coupling Efficiency approaching 99% makes this approach highly useful.

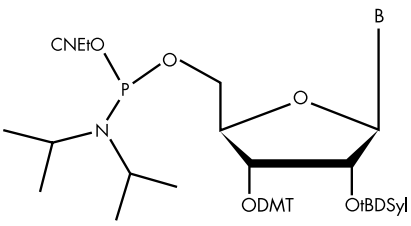
## Structural Features:

- The reverse RNA monomer phosphoramidites carry a 3′- DMT group, 2′-tBDsilyl ( tBDSi) or 2′- triisopropylsiloloxymethyl ( TOM) and 5′- cyanoethylphosphoramidite (CED) group (depicted in structures 1 & 2 respectively).




3′-DMT-2′-tBDSilyl-5′-CPG

**B;** A(n-bz)
C(n-bz)
C(n-ac)
G(n-ibu)
U




3′-DMT-2′-tBDSilyl-5′-Amidites

**B;** A(n-bz)
C(n-bz)
C(n-ac)
G(n-ibu)
U

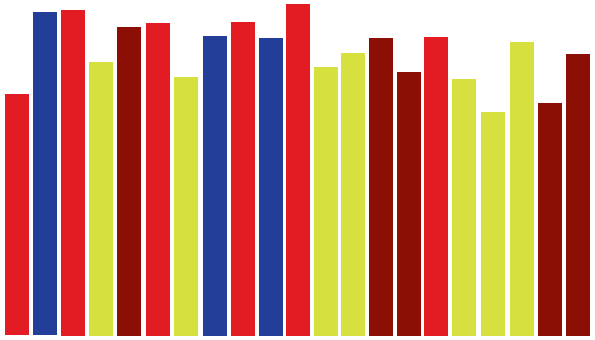
## Key Applications:

- Highly efficient synthesis of synthetic RNA in the Reverse direction.
- Application in convenient introduction of Ligands, chromphores and and modifications of Synthetic RNA at the 3′- end.
- Design of Sense Strand of SiRNA & challenging 3′-Modification of RNA

## Quality Control:

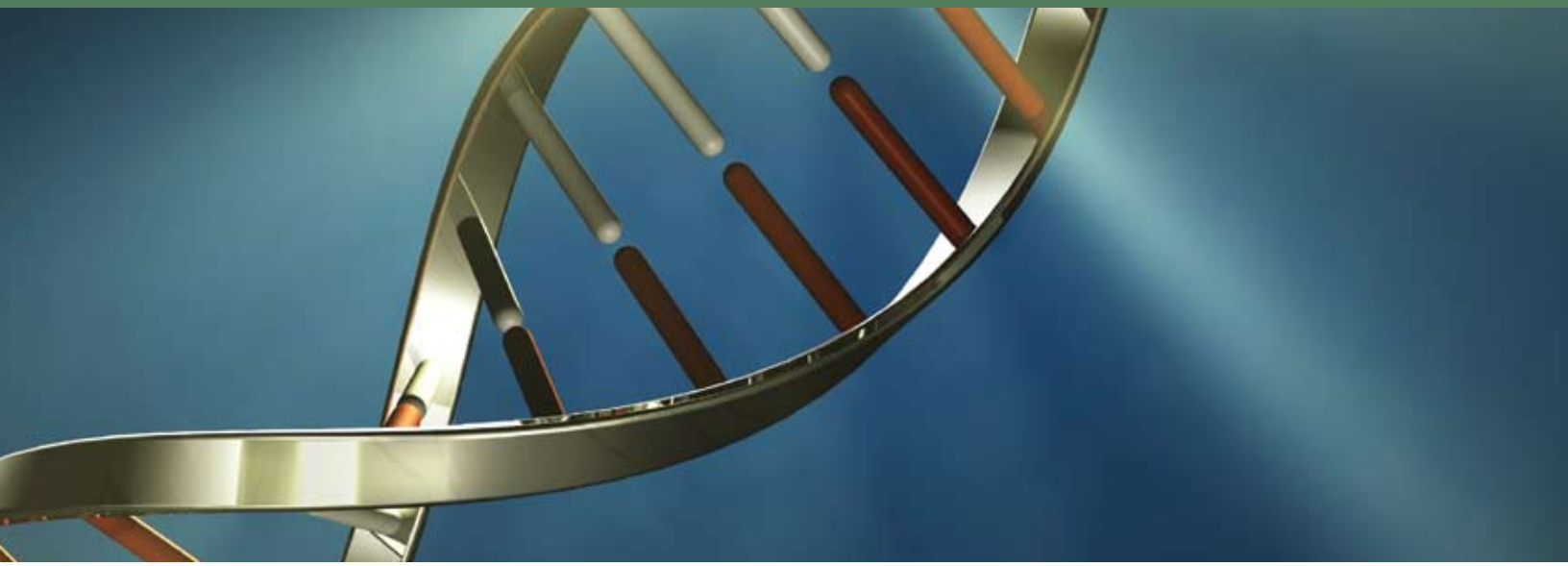
- HPLC Purity of 98% and greater
- $^{31}P$ NMR purity from 98-100%
- Coupling Efficiency approaches 99% per step.

**21- Mer RNA synthesized in 5′ to 3′ Direction**



Average Stepwise Yield: 99.6% Using Sequence Leveling

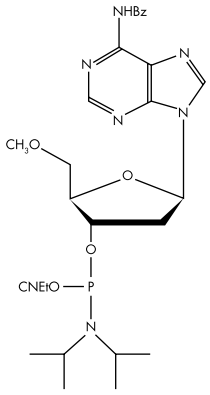
# 5′-O-Methyl DNA Phosphoramidites



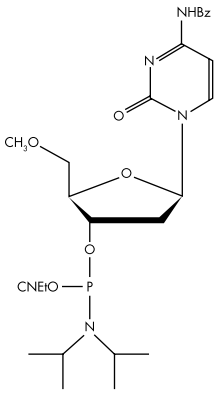
- Chain Terminators for Synthetic DNA using all four amidites.
- All four 5′-O-Methyl-2′-deoxy A,C,G and T-3′-amidites are available for oligo synthesis and incorporating at the 5′-end of oligo.

## Quality Control

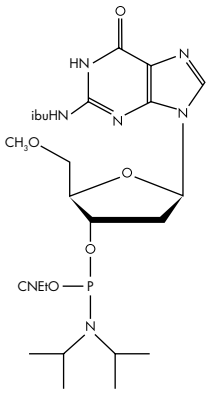
- HPLC purity greater than 98%
- 31 P NMR purity greater than 98%
- Coupling efficiency greater than 98%



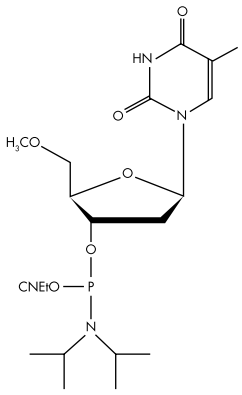

5′-O-Methyl-Adenosine (n-bz)
CED OP
Catalog #:
**ANP-5511**




5′-O-Methyl-Cytidine (n-bz)
CED OP
Catalog #:
**ANP-5512**




5′-O-Methyl-Guanosine (n-ibu)
CED OP
Catalog #:
**ANP-5513**




5′-O-Methyl Thymidine
CED OP
Catalog #:
**ANP-5514**

ChemGenes CORPORATION

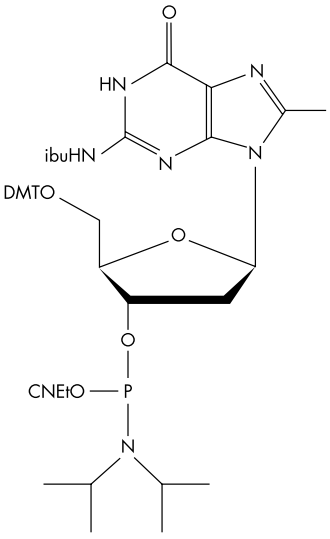
# 8-Methyl Guanosine Phosphoramidites

## 8-Methyl-2′-dGuanosine & 8-Methyl-rGuanosine:

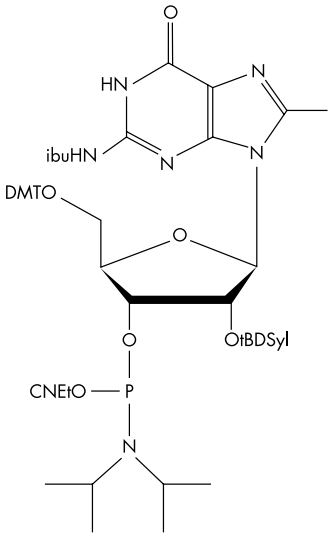
- Powerful Z–DNA stabilizer
- Reading effects B & Z transformation in oligonucleotides
- Can be incorporated into appropriate positions of synthetic DNA

## Applications:

- For study of functional role in Gene Expression, transcription control etc.
- Selectivity of Z DNA in protein interactions
- DNA supercoiling modulation
- Selective Targeting of proteins or enzymes
- Aptamer Design and Therapeutic development




8-Methyl deoxy Guanosine
CED OP
Catalog #:
**ANP-9274**




8-Methyl ribo Guanosine
CED OP
Catalog #:
**ANP-6274**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