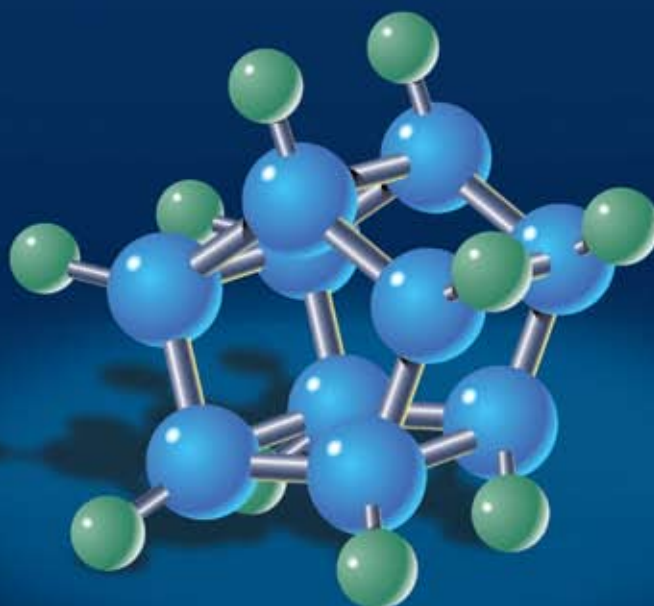


2008, Vol. 2.0



 **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.

### **TLC**

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

### **HPLC**

- Greater than 98.5% purity by HPLC.

### **<sup>31</sup>P NMR**

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

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

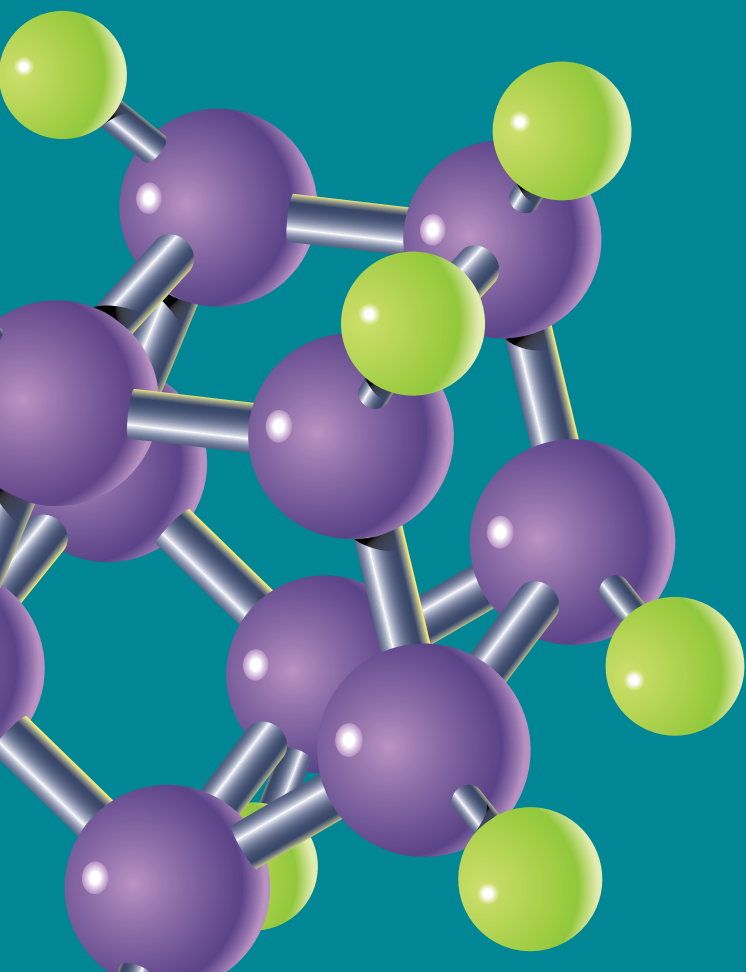
- The ratio between 250/260 nm.
- The ratio between 260/280 nm.
- Emax position.
- Extinction Coefficient.

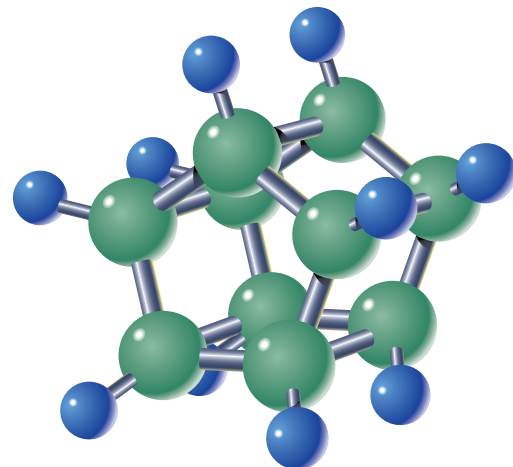
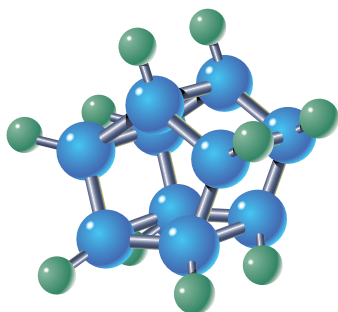
### **MASS Spectrum**

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

### **<sup>1</sup>H NMR**

- Proton NMR analysis is performed for each product.





## 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

### Triphosphates

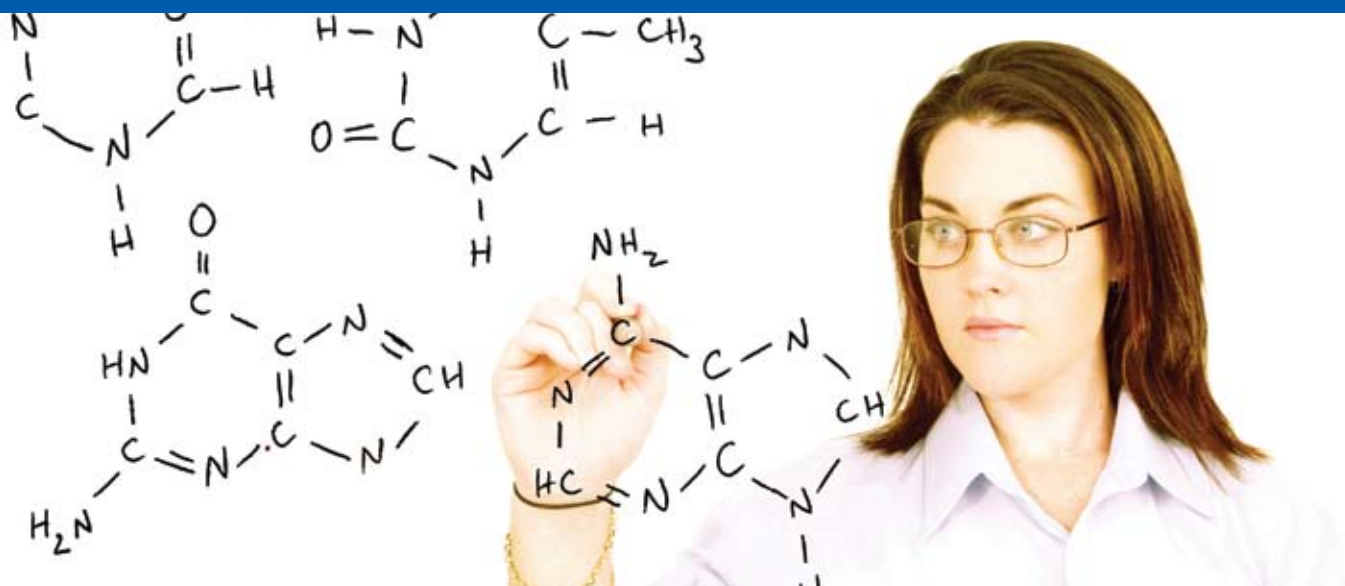
Modified Triphosphates

### 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

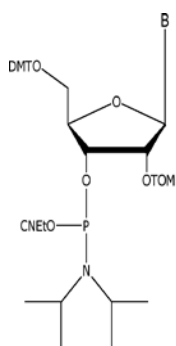
# TOM Phosphoramidites



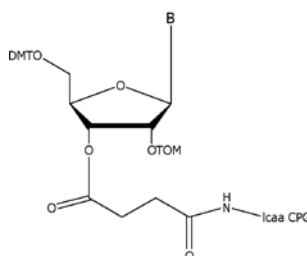
- Now available in Bulk Quantity for RNA Therapeutics development
- Superior Quality RNA using 2'-O-TOM protection.
- Perfected Manufacturing Process allows for prices comparable to TBDMS.
- Higher Coupling Efficiency due to lower steric hindrance.
- Faster Coupling Times. (2-4 minutes, varies based on scale and activator).

## Quality Guaranteed

- Purity greater than 97% by HPLC.
- UV Spectral data to conform to highest.
- 1 H NMR & 31 P NMR data to conform.
- Coupling efficiency greater than 98%.
- Produced under GMP guidelines.
- No base modification or M+30 observed.



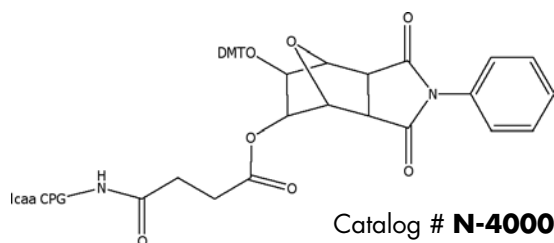
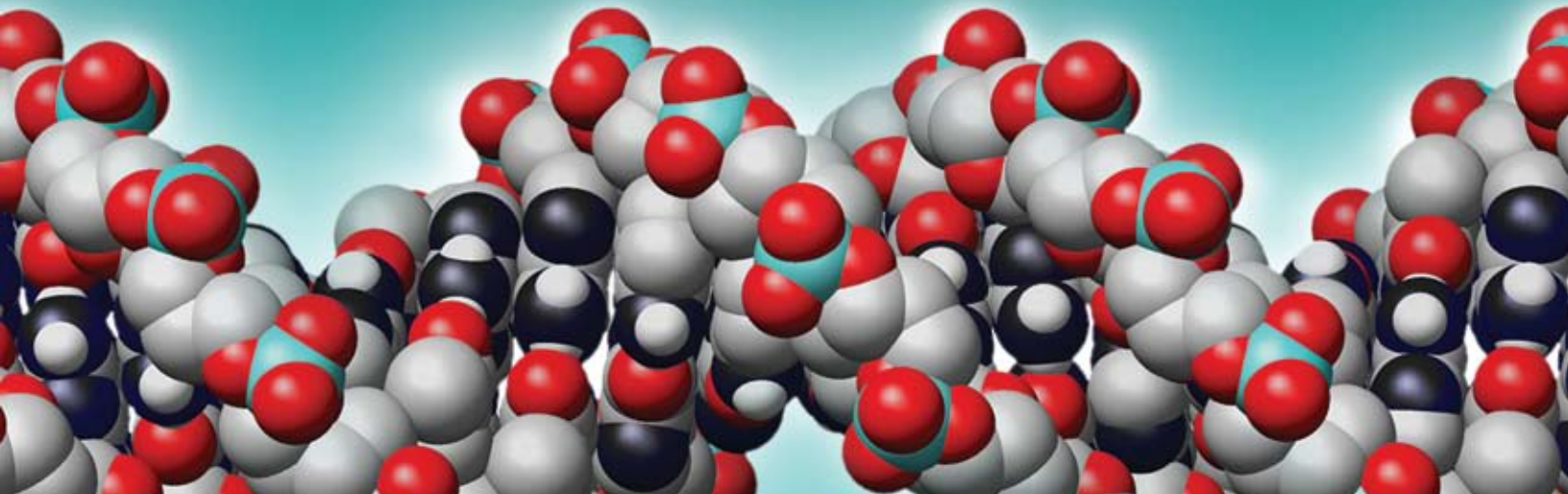
B	Protection	Catalog #
A	n-acetyl	<b>ANP-3201</b>
C	n-acetyl	<b>ANP-3202</b>
G	n-acetyl	<b>ANP-3203</b>
U	n/a	<b>ANP-3205</b>



B	Protection	Catalog #	Pore Size
A	n-acetyl	<b>N-32001-05</b>	500A
		<b>N-32001-10</b>	1000A
C	n-acetyl	<b>N-32002-05</b>	500A
		<b>N-32002-10</b>	1000A
G	n-acetyl	<b>N-32003-05</b>	500A
		<b>N-32002-10</b>	1000A
U	n/a	<b>N-32005-05</b>	500A
		<b>N-32005-10</b>	1000A

**Low to High loading CPG supports with TOM-monomer for uniform deprotection of RNAs.**

# Universal and Non-Cleavable Supports



- Fully compatible with standard phosphoramidite reagents and synthesis conditions.
- Has standard DMT group and requires standard de-block solutions to start and oligonucleotide synthesis.
- Coupling efficiency  $\geq 99\%$ .
- Results in 3'-OH oligonucleotides.
- Has standard succinate linkage and so cleavage from support is quantitative during ammonia incubation.

## Applications of UnyLinker Support — Compatible with synthesis of:

DNA Oligonucleotides, Phosphorothioates, 2'-O-alkyl oligonucleotides, LNA oligonucleotides, siRNA oligonucleotides in combination with Cpep protection, Biotin and Fluorescein (FAM).

## Cleavage and Deprotection

- No Need to add/use.
- Salts like LiCl or NaCl.
- Stronger nucleophiles like 40% aqueous methylamine solution.
- Heavy metals.
- Sulfides.

**No base Modification is observed (based on Ion Pair LC-MS; detection limit = 0.01%)**

## Inherent Advantage of UnyLinker Molecule

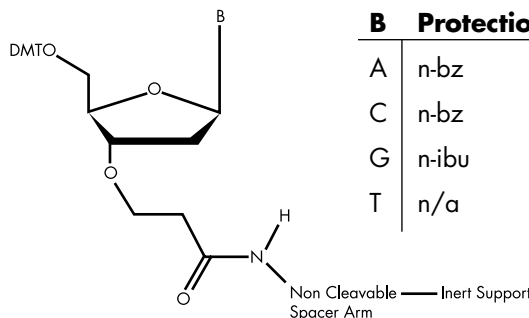
- Conformationally syn-oriented to effect fast cleavage.

## Non-Cleavable Supports:

- Inert in nature and is amenable to oligonucleotide synthesis.
- Irreversible support leads to oligo synthesis of coupling efficiencies of 98-99% per step for a chain length of 20-40 mers.

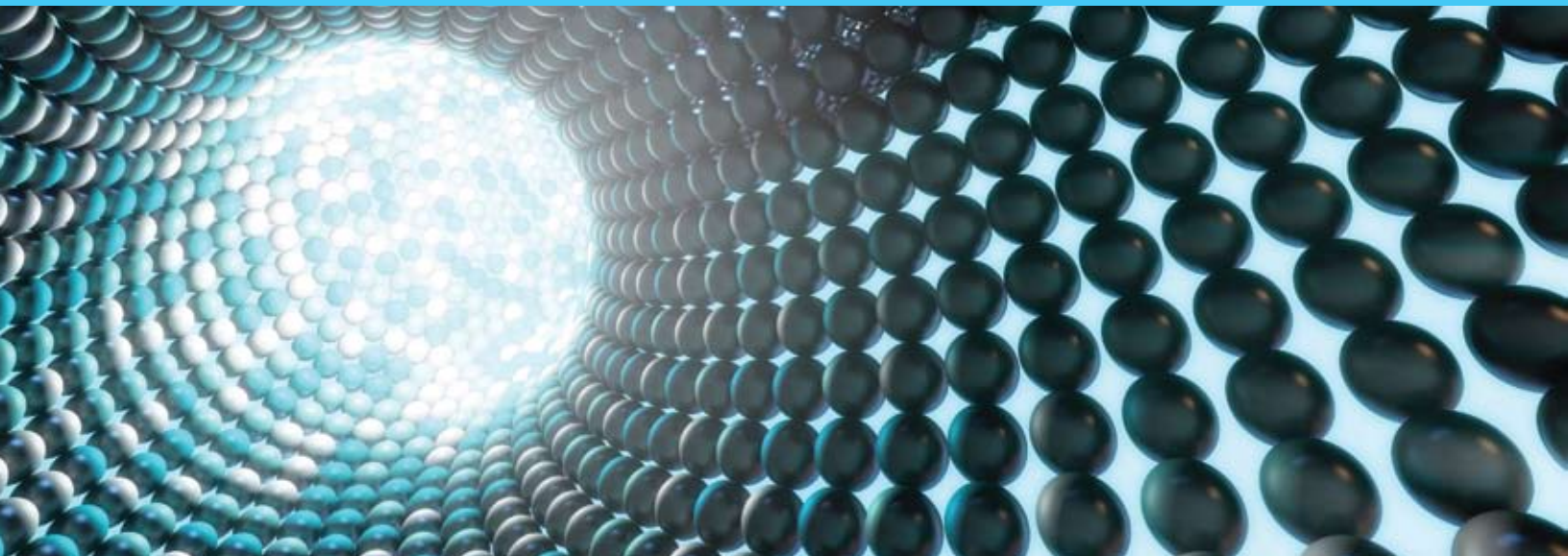
## Applications of Non-Cleavable Supports:

- Affinity Chromatography, One beach one compound combinatorial libraries, PCR amplification.



B	Protection	Catalog #	Pore Size
A	n-bz	<b>N-7521</b>	<b>300A</b>
C	n-bz	<b>N-7522</b>	<b>300A</b>
G	n-ibu	<b>N-7523</b>	<b>300A</b>
T	n/a	<b>N-7524</b>	<b>300A</b>

# 7-Deaza Products



## ChemGenes has perfected the technology of productions of these modified bases and the corresponding phosphoramidites

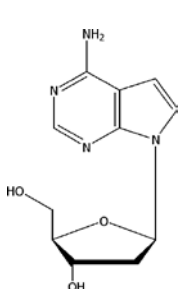
These modifications find extensive application in the design and selection introduction of these modified bases into DNA. Some of the key properties of the 7-deaza modification are outlined:

- Avoids the problem of extensive secondary structure formation, and thereby improves the targeted hybridization.
- Antiparallel triple helix formation with double stranded DNA is favored with this modification.
- The nucleoside and corresponding triphosphates are currently used in DNA sequencing analysis.

## ChemGenes has extensive capabilities in the following

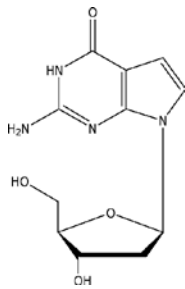
- Bulk quantities of the 7-deaza-2'-deoxy nucleosides for DNA sequencing and molecular biology studies.
- Highest purity 7-deaza-2'-deoxy nucleoside phosphoramidites for specific introduction of these modified bases into synthetic DNA sequences.

ChemGenes currently has available the nucleosides; 7-Deaza-r-adenosine, 7-deaza-r-guanosine and 7-deaza-r-inosine, as well as the corresponding 2'-tBDSilyl phosphoramidites.



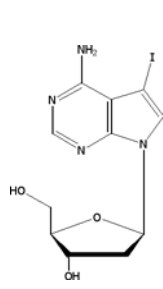
7-Deaza deoxy  
Adenosine

Catalog #  
**DN-1143**



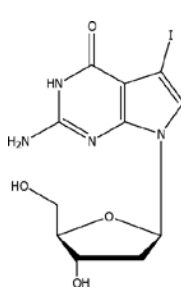
7-Deaza deoxy  
Guanosine

Catalog #  
**DN-4567**



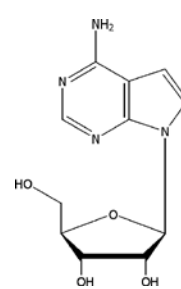
7-Deaza-7-Iodo  
deoxy Adenosine

Catalog #  
**DN-2561**



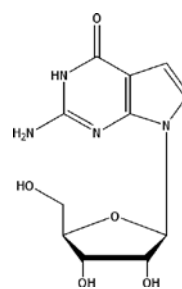
7-Deaza-7-Iodo  
deoxy Guanosine

Catalog #  
**DN-2563**



7-Deaza ribo  
Adenosine

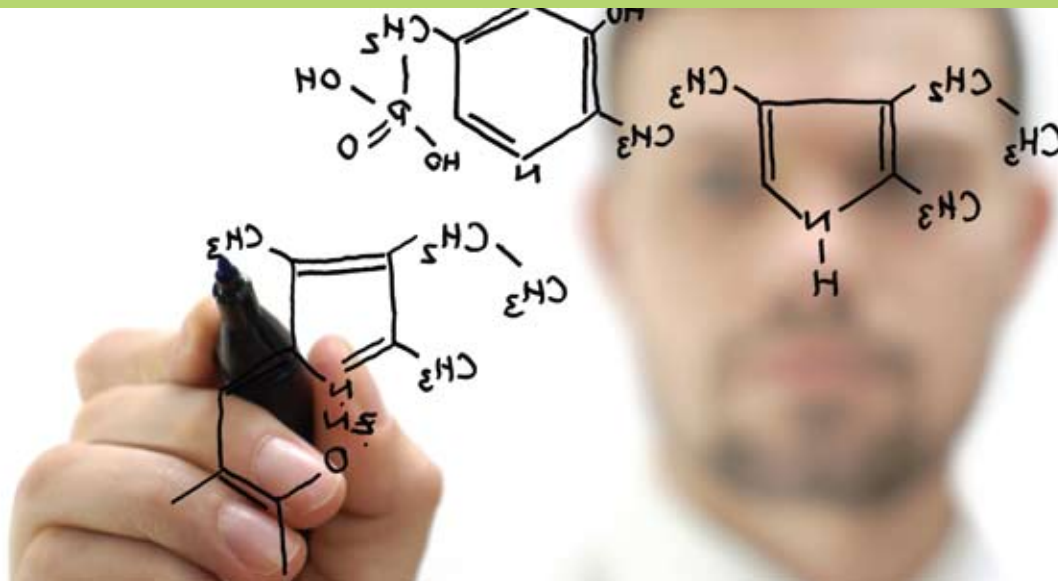
Catalog #  
**RP-2312**



7-Deaza ribo  
Guanosine

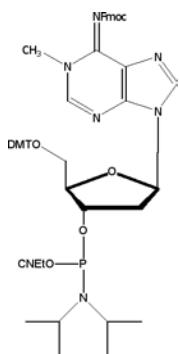
Catalog #  
**RP-2313**

# N-Alkylated Phosphoramidites



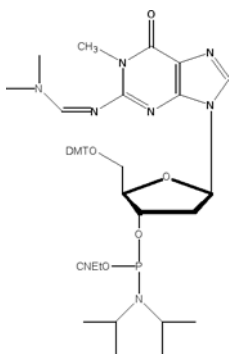
- ChemGenes offers the phosphoramidites for studies and possibilities of reversal of methylated lesions by use of oligonucleotides incorporation alkylated purine/pyrimidine.
- Due to mutagenic effects of carcinogens, DNA in living organisms is vulnerable to alkylation.
- It has been shown that there 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.

## Our featured products include:



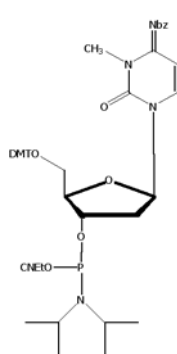
N1-Methyl deoxy  
Adenosine  
Phosphoramidite

Catalog # **ANP-6121**



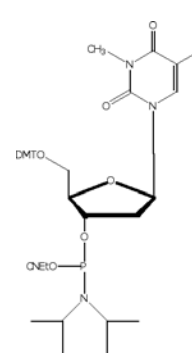
N1-Methyl deoxy  
Guanosine  
Phosphoramidite

Catalog # **ANP-6122**



N3-Methyl deoxy  
Cytidine  
Phosphoramidite

Catalog # **ANP-3851**

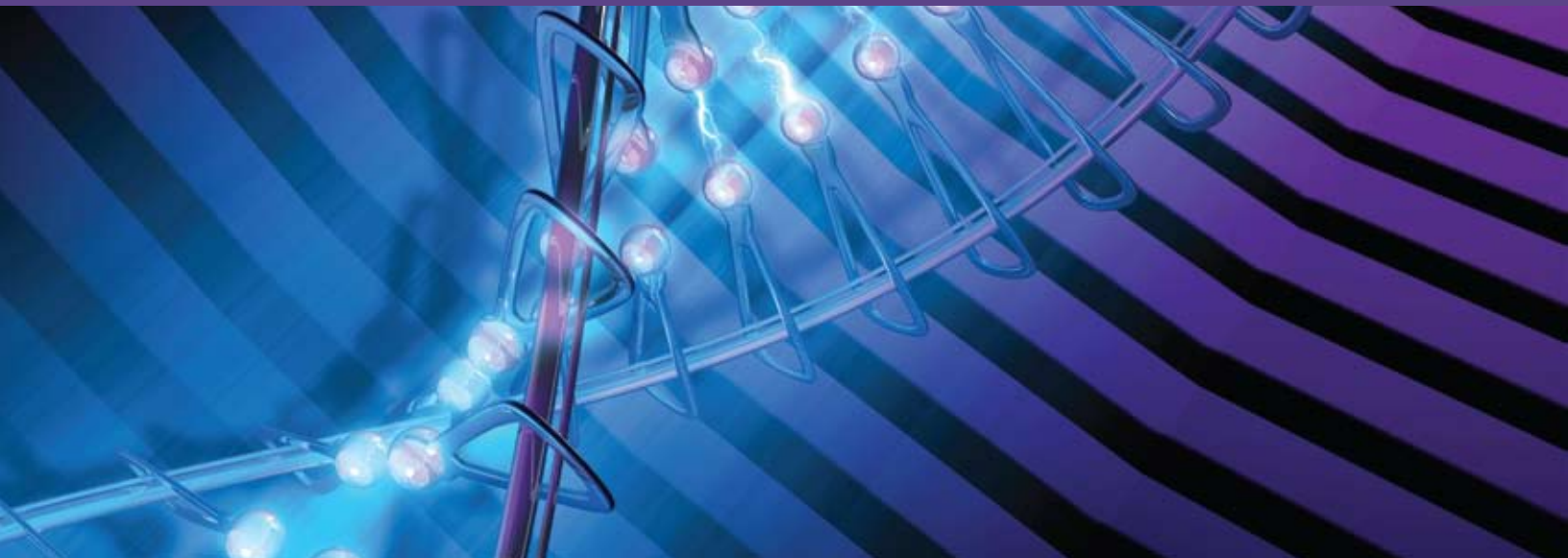


N3-Methyl Thymidine  
Phosphoramidite

Catalog # **ANP-6153**

(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).

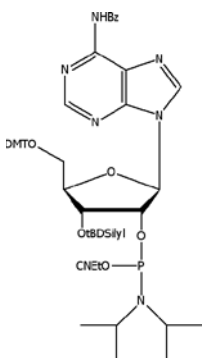
# 3'-tBDSilyl RNA Phosphoramidites



- 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.

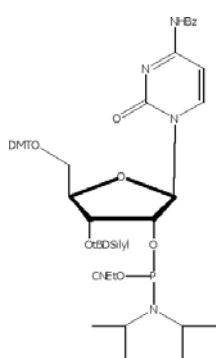
## Useful Applications

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



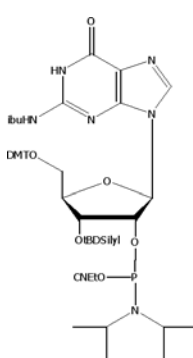
Adenosine (n-bz) 3'-tBDSilyl  
CED OP

Catalog #  
**ANP-5681**



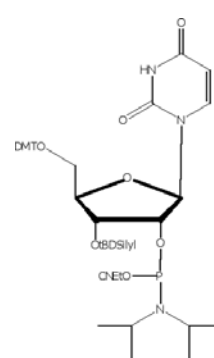
Cytidine (n-bz) 3'-tBDSilyl  
CED OP

Catalog #  
**ANP-5682**



Guanosine (n-ibu) 3'-tBDSilyl  
CED OP

Catalog #  
**ANP-5683**

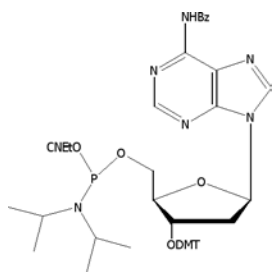


Uridine 3'-tBDSilyl  
CED OP

Catalog #  
**ANP-5684**

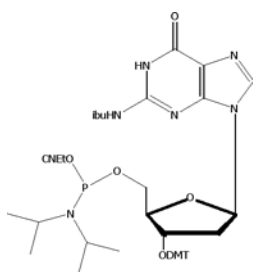
# Reverse DNA and RNA Oligo Synthesis

- ChemGenes offers reverse amidites with 5', 3'-direction of synthesis.
- Including reverse 2'-O-Methyl amidites, Reverse Abasic Amidite, Reverse deoxy Amidites, and more....



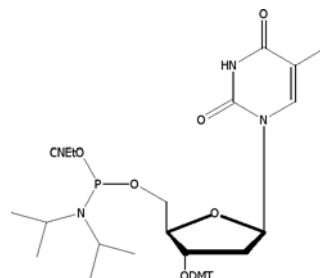
3'-DMT deoxy Adenosine  
(n-bz) 5'-CED OP

Catalog # **ANP-4671**



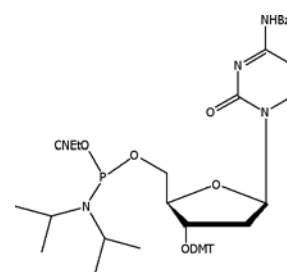
3'-DMT deoxy Guanosine  
(n-ibu) 5'-CED OP

Catalog # **ANP-4673**



3'-DMT Thymidine  
5'-CED OP

Catalog # **ANP-4674**



3'-DMT deoxy Cytidine  
(n-bz) 5'-CED OP

Catalog # **ANP-4672**

## Application of Reverse Phosphoramidites

- Synthesis of 3'-3'-linked DNA.
- Synthesis of special oligonucleotides required to be coupled at the 5'-end selectively.
- Synthesis of oligonucleotides from left to right (5'-3'-direction).

- Also available are reverse 2'-O-Methyl RNA

B	Protection	Catalog #
A	n-bz	<b>ANP-1012</b>
C	n-bz	<b>ANP-1013</b>
G	n-ibu	<b>ANP-1014</b>
U	n/a	<b>ANP-1015</b>

## Reverse RNA oligos

- For efficient synthesis of Long Chain Oligos
- For efficient RNA synthesis with Ligand or Chromophore attachment at 3'-end of RNA.

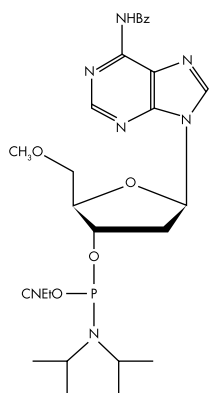
# 5'-O-Methyl DNA Phosphoramidites



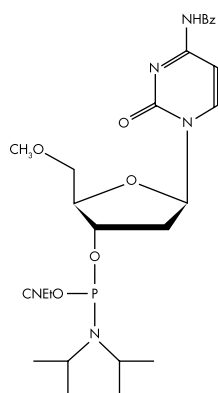
- Chain Terminators for Synthetic DNA using all four amidites.
- All four 5'-O-Methyl-2'-deoxy A,C,G and T-3'-amidites are available for oligo synthesis and incorporating at the 5'-end of oligo.

## Quality Control

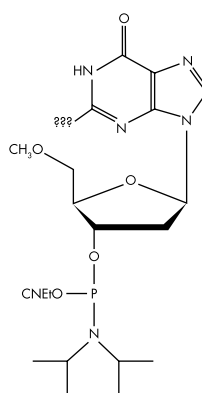
- HPLC purity greater than 98%
- <sup>31</sup>P NMR purity greater than 98%
- Coupling efficiency greater than 98%



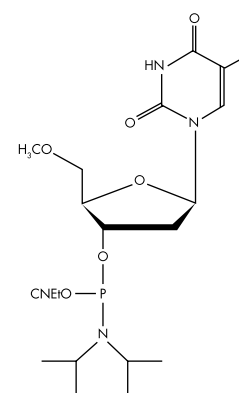
5'-O-Methyl-Adenosine (n-bz)  
CED OP



5'-O-Methyl-Cytidine (n-bz)  
CED OP



5'-O-Methyl-Guanosine (n-ibu)  
CED OP



5'-O-Methyl-Thymidine  
CED OP

# 8-Methyl Guanosine Phosphoramidites



## 8-Methyl deoxy Guanosine amidite

- TBD
- TBD
- TBD

## 8-Methyl deoxy Guanosine amidite

- TBD
- TBD
- TBD



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[www.chemgenes.com](http://www.chemgenes.com)