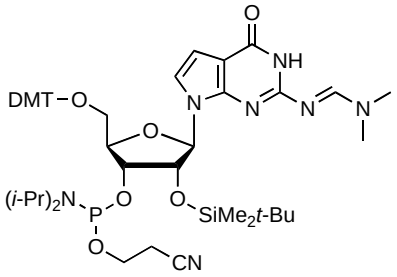
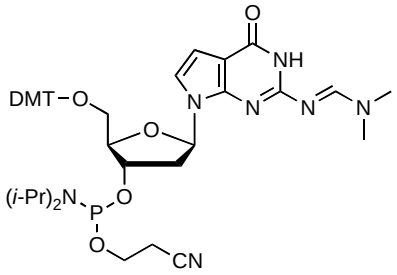
7-Deaza-G CEP
Product No. BA 0323
Product Information



$C_{50}H_{68}N_7O_8PSi$
Mol. Wt.: 954.18

Installation of 7-Deaza-G (c^7G) residues in G-rich regions can disrupt unwanted hydrogen bonding.

G-Rich regions in nucleic acids often display disrupted Watson-Crick base-pairing due to the ability of dG and G residues to enter into non-Watson-Crick inter- and intramolecular hydrogen bonding. A solution to this problem is to replace the N^7 nitrogen atom on the guanine nucleobase with a CH group, obviating the possibility of hydrogen bonding at that position.[1] We have long offered 7-Deaza-dG CEP (BA 0008), and now introduce 7-Deaza-G CEP (BA 0323) for oligoribonucleotide synthesis.



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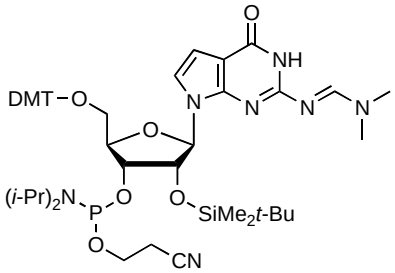

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There are several literature reports on the incorporation of 7-deazaguanosine residues into oligoribonucleotides.[2-5] Seela and Mersmann[2] originally reported a methyl phosphoramidite that employed an MMT, Si(*i*-Pr)$_3$ (or SiMe$_2$*t*-Bu), and isobutyryl protection scheme. Later, they switched to an H-phosphonate approach that involved MMT/Si(*i*-Pr)$_3$/(dimethylamino)methylidine protection.[3] The switch from an isobutyryl to a (dimethylamino)methylidine protecting group for the exocyclic amine resulted in a 5x faster removal with ammonia without sacrificing stability during oligonucleotide synthesis. Seela and Mersmann found that 7-deazaguanosine residues caused disaggregation of G_4 structures. McLaughlin and co-workers then reported the use of a cyanoethyl phosphoramidite with DMT/SiMe$_2$*t*-Bu/phenylacetyl protection.[4] Normal

RNA synthesis and deprotection techniques were used to make a variety of hammerhead ribozyme/substrate complexes with substitutions in both the 19-mer ribozyme and the 24-mer substrate. The absence of the N^7 nitrogen was found to play no critical role. Finally, Gait and co-workers reported a cyanoethyl phosphoramidite with MMT/Si(*i*-Pr)$_3$/(dimethylamino)methylidine protection.[5] Using standard RNA synthesis and deprotection protocols, they made three-stranded ribozymes with 7-deazaguanosine at critical G positions and use them to study the structure of hairpin ribozymes.

We now offer a novel version of this phosphoramidite that combines the easily-removed (dimethylamino)methylidene protecting group for the exocyclic amine with now-standard DMT/SiMe$_2$*t*-Bu protection and a cyanoethyl phosphoramidite.

Use of 7-Deaza-G CEP: Employ acetonitrile diluent at the concentration recommended by the synthesizer manufacturer. Use standard RNA coupling protocols (ie. 12 minute coupling for the Expidite 8909). In our hands, 30 minute coupling was not required, but still provided good results. Cleavage from the solid support may be carried out by standard procedures using 3:1 concentrated ammonium hydroxide:ethanol. Standard nucleobase deprotection conditions may be employed. Extended exposure to the deprotection conditions (ie. 48 hours at room temperature or 24 h at 55 °C) is not needed, however only limited product degredation is observed. Note that multiple 7-deaza-G incorporations may require switching from iodine to an oxidant such as 0.5 M camphorsulfonyloxaziridine based on work on 7-deaza-dG.[6]

References:

(1) Seela, F.; Driller, H. *Nucleic Acids Res*. **1989**, *17*, 901-910.

(2) Seela, F.; Mersmann, K. *Heterocycles* **1992**, *34*, 229-235.

(3) Seela, F.; Mersmann, K. *Helv. Chim. Acta* **1993**, *76*, 1435-1449.

(4) Fu, D.-J.; Rajur, S. B.; McLaughlin, L. W. *Biochemistry* **1993**, *32*, 10629-10637.

(5) Grasby, J. A.; Mersmann, K.; Singh, M.; Gait, M. J. *Biochemistry* **1995**, *34*, 4068-4076.

(6) Glen Research information for 7-Deaza-dG CE Phosphoramidite, product 10-1021.