

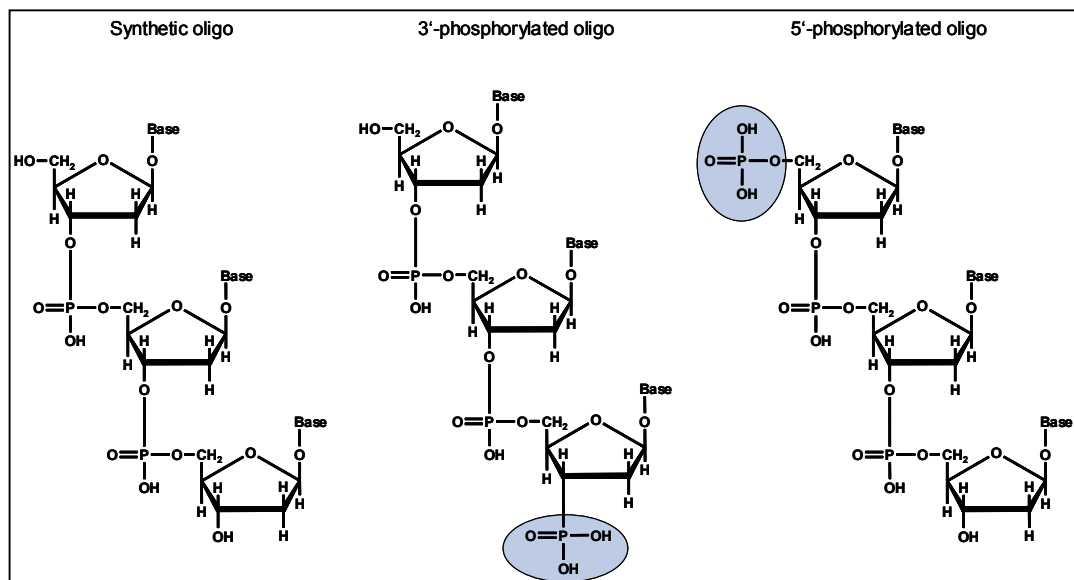
# Phosphorylation of Oligonucleotides

## Description

Chemically synthesized nucleic acids are not phosphorylated at their 3'- and/or 5'- ends. Phosphorylation, however, might be required for various biological applications, so it is available as a 3'- or 5'- modification from Thermo Electron.

Compared to the widely used enzymatic phosphorylation of nucleic acids with kinases, chemical phosphorylation is highly reproducible and allows more effective labelling of the oligonucleotide termini.

Phosphorylation of 5'-ends is strictly required for enzymatic ligation of nucleic acids, as ligases need a 5'-phosphate and a 3'-OH to link two oligonucleotides (formation of phosphodiester bond). In contrast, phosphorylation of 3'-ends can be used for PCR elongation blocking, as DNA polymerases need a free 3'-OH group on the primer to be able to add bases. However, the most efficient tool for 3'-blocking is 3'-Spacer C3. 3'- or 5'-phosphorylated oligonucleotides are also used as substrates for repair studies.



## Advantages

- mimics natural nucleic acid structure
- ensures better phosphorylation efficiency than using enzymatic reactions (e.g., kinases)

## Applications

- fast and easy enzymatic ligation of nucleic acids (e.g., DNA into vector molecules) [1]
- inhibition of PCR elongation reactions
- substrate for DNA repair studies [2]

## Product offering

5'- and 3'- phosphorylation is available at all synthesis scales from 0.02  $\mu$ mol up to 10  $\mu$ mol, with the following length restrictions:

phosphate at terminus	maximum length
5'	130 bases
3'	75 bases

### **Please note:**

It is not possible to attach additional modifications to an oligo terminus that already carries a phosphate. If you would like to order phosphate oligos with further modifications, these must be positioned at the other oligo terminus or internally.

	5'-phosphate	3'-phosphate
additional modification only possible	at 3'-terminus or internally	at 5'-terminus or internally

Easily order via the web: [www.thermo.com/oligos](http://www.thermo.com/oligos) or via email: [sales.oligos@thermo.com](mailto:sales.oligos@thermo.com)

## Literature

Sambrook, Frisch, Maniatis: Molecular Cloning; A laboratory manual.  
Section 1; pp 1.53-1.73

Karimi-Busheri *et al.*, (1998) Repair of DNA strand gaps and nicks containing 3' phosphate and 5' hydroxyl termini by purified mammalian enzymes: Nucleic Acid Research, 1998; Vol.26, No.19; pp 4395-4400

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