

Oligonucleotide Synthesis

Individual needs, high throughput or bulk quantities, Bioneer has your oligo bases covered.

- Free Bio-RP™ purification
- Near HPLC purity
- 100% guaranteed performance for your application, or we'll make it again

Bioneer, founded in 1992, is one of the world's leading suppliers of synthetic oligonucleotides (DNA and RNA). In-house production of raw materials (phosphoramidites, reagents & solvents) along with automated synthesis and purification systems result in superior quality oligos at a great price. Since Bioneer manufactures all the components of our oligos, we manage the quality control every step of the way—ensuring that you receive only the highest quality product. Every Bioneer oligo is purified free of charge utilizing our unique Bio-RP cartridge purification technology (a \$15 value).

Bio-RP removes many impurities and synthesis failure products that are still present in an oligo after desalting*. These impurities contribute to the OD measurement of competitor oligos that are merely desalted—and artificially inflate their yield (see below). The end result of Bioneer's Bio-RP cartridge purification is near HPLC quality purification with only full-length product. We are so confident in our oligos that we are the only company to offer a 100% guarantee that they will work for your PCR or qPCR application!

With high throughput oligo synthesis facilities around the world, Bioneer's daily capacity is unsurpassed. Bioneer is unrivalled in its ability to address the needs of customers requiring a few oligos on a regular basis and those customers that require very large numbers of oligos on a less frequent basis. We respond to your needs—personally.

Did you know?

Oligo desalting vs Bio-RP™ Purification:

Most oligos sold are merely deprotected/desalted. The process of deprotection/desalting only partially purifies the oligo and leaves behind many impurities* and failure products (truncated oligos that will not amplify, and can even interfere with certain applications). These can lead to artificially inflated OD readings that increase with oligo length. Bio-RP purification removes all these contaminants and failure products, resulting in an oligo that is near HPLC purity. The advantage to you is that our product contains only quality oligos without impurities that can inhibit some PCR reactions, and potentially skew qPCR reactions. We have the same amount of active oligo as our competitors; they just have more "other" inflating their OD. To demonstrate this, plates of Oligos of various sizes were tested for concentration in 2 steps: 1) After a deprotection/desalting step only, and 2) after Bio-RP purification. (Fig. 1)

The results of these tests show that the amount of failed sequences and impurities* increase with length (as expected), but are not removed by deprotection/desalting alone. This results in inflated OD readings for oligos depending on oligo size. (Table 1)

*Impurities in desalted oligos may include: Acetonitrile, Pyridine, Iodine, Ethylthio tetrazole, Dichloromethane, Acetic acid, Acrylonitrile, Benzamide and Isobutyramide.

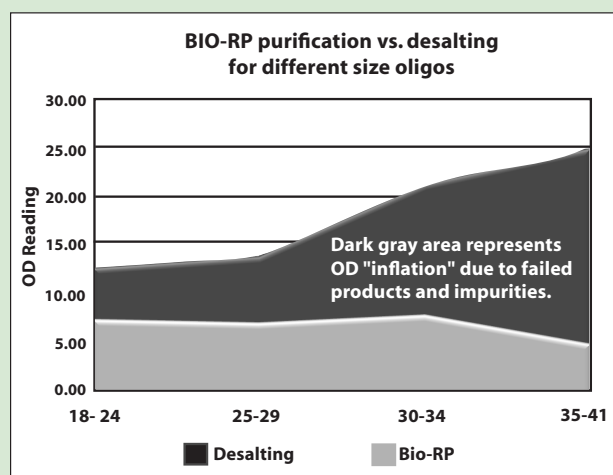


Fig 1. Plates of Oligos of various lengths were tested for concentration after desalting and then by Bio-RP cartridge purification. Note inflated OD readings when deprotection/desalting alone is used.

Oligo Size	18 - 24	24 - 29	30 - 34	35 - 41
OD Inflation	38%	45%	60%	77%

Table 1. Average OD inflation seen for oligos of various sizes when protection/desalting alone is employed. Note for longer oligos, up to 77% of product does not consist of functional oligo.

What we offer—personal service!

Based on volume, modification and scale, Bioneer oligos can be classified as follows:

Standard Custom

- Oligos with no modification, Bio-RP purification, provided in a tube format.

Modified for qPCR and other applications

- Most common modifications are available and can be ordered in tubes or plates.

Purified

- All oligos are Bio-RP purified free-of-charge; HPLC and PAGE purification is also available.

Extendamers™ (Long oligomers)

- Oligos up to 200 mers can be synthesized with Bio-RP or PAGE purification.

Large Scale (Bulk)

- Milligram to tens of grams of oligos, including standard, modified and purified.

High Throughput

- Very large numbers of oligos supplied in 96- or 384-well plate format.

Stock/Pre-made Primers

- Stock primers pre-made, PAGE purified and available off-the-shelf from Bioneer.

Tell us what you need

Bioneer's production can accommodate orders ranging from milligrams to tens of grams of the purest DNA and RNA, including both standard and modified. Our list of synthesis services are below, but if you need something else, please ask us!

Synthesis Services		
Type	Scale	Base Limitation
Custom / Standard	<ul style="list-style-type: none"> 25 nmole 50 nmole 200 nmole 1 umole 10 umole 15 umole 	<ul style="list-style-type: none"> 25 nmole: 15-60 mer 50 nmole: 10-75 mer 200 nmole: 5-110 mer 1 umole: 5-130 mer 10 umole: 5-50 mer 15 umole: 5-50 mer
High Throughput	<ul style="list-style-type: none"> 25 nmole 50 nmole 200 nmole 1 umole 10 umole 15 umole 	

So many Modifications...

All common modifications are available including those in the table at right. Our fluorogenic oligonucleotides for qPCR, are unsurpassed in quality, and priced for value. In addition to the modifications listed, we may be able to accommodate custom modifications to fit your needs. Please contact support@bioneer.us.com for more information.

Available Modifications*			
Common	5' - C6 Amine 5' - Phosphate 5' - Biotin 5' - Biotin TEG 5' - C2 Aldehyde 5' - C3 Spacer 5' - C6 Spacer 5' - C10 Carboxylic Acid 5' - C12 Spacer 5' - Cholesteryl 5' - dS spacer 5' - 5-Methyl dC 5' - 18 Atom Spacer 5' - Thiol C6**	3' - C6 Amine 3' - Phosphate 3' - Biotin 3' - C3 Spacer 3' - C6 Spacer 3' - C12 Spacer 3' - Biotin TEG 3' - Thiol 3' - C18 Atom Spacer 3' - dS Spacer 3' - 5-Methyl dC 3' - Cholesteryl 3' - Inverted dT	Internal Amine dT Internal Biotin dT Internal 18 Atom Spacer Phosphorothioate Inosine Internal C3 Spacer Internal C6 Spacer Internal C12 Spacer Internal dS Spacer Internal 5-Methyl dC Biotin TEG Ferrocene-dT 5-Hydroxymethyl dC 5-Hydroxy dU 5-Hydroxymethyl dU 5-F-dU 8-Oxo-dA 8-Oxo-dG Deoxy Uridine 5-Bromo dU
Fluorescent Dye	5' - 6-FAM (fluorescein) 5' - TAMRA 5' - HEX 5' - TET 5' - IR700 5' - IR800	3' - 6-FAM (fluorescein) 3' - dT HEX 3' - TAMRA DABCYL	Internal-FAM (Fluorescein dT)**
Dual Labeled	5' - FAM_3' - TAMRA 5' - FAM_3' - DABCYL 5' - TAMRA_3' - DABCYL	5' - HEX_3' - TAMRA 5' - HEX_3' - DABCYL	5' - TET_3' - TAMRA 5' - TET_3' - DABCYL
Antisense	Chimeric RNA Bases	Chimeric RNA Bases (HPLC purified)	2-O-Me-RNA Bases

*Modified oligo starts at 50 nmole synthesis scale.

**Modification available only for custom oligos.

What we offer—Purity above and beyond!

Purification Options

All oligos synthesized by Bioneer are purified using the Bio-RP purification system. This service is available free of charge on all oligos. We also offer HPLC purification and PAGE purification.

Features of Purification Options

Bio-RP (OPC - Oligonucleotide Purification Cartridge)—

Free-of-charge on all scales:

- ✓ Better than ethanol precipitation or Sephadex G-25 column chromatography
- ✓ Bio-RP not only desalts, but also removes virtually all of the failed products of synthesis
- ✓ Near HPLC quality

HPLC (High Performance Liquid Chromatography) available on all scales, except 25 nmole

- ✓ For applications such as cloning, site-directed mutagenesis, or qPCR
- ✓ RP-HPLC purification for added purity
- ✓ > 90% purification efficiency (range varies according to the length of oligos)

PAGE (Polyacrylamide Gel Electrophoresis) Available on all scales, except 25 nmole

- ✓ Recommended purification method for long oligos, up to 200 mer
- ✓ > 95% purification efficiency
- ✓ Ultra pure oligo, but lower yields than OPC and HPLC

Shipping Information and Turnaround Time

We know that time is of the essence and we always do our best to please. In our production process, quality is our first priority, followed very closely by time. We ship as soon as we are able and have 24 hour production.

Turnaround Time	
Service	Description of Service
Standard, non-modified, Bio-RP	Order by 5:00 PM PST (8:00 PM EST) any week day – oligos are shipped lyophilized within 48 hours
Standard, non-modified, HPLC	Order by 5:00 PM PST (8:00 PM EST) any week day – oligos are shipped lyophilized within 48 hours
Standard, non-modified, PAGE	Order by 5:00 PM PST (8:00 PM EST) any week day – oligos are shipped lyophilized within 7 working days or sooner
Standard, modified, Bio-RP	Order by 5:00 PM PST (8:00 PM EST) any week day – oligos are shipped lyophilized within 48 hours*
Standard, modified, HPLC	Order by 5:00 PM PST (8:00 PM EST) any week day – oligos are shipped lyophilized within 3 working days or sooner
Standard, modified, PAGE	Order by 5:00 PM PST (8:00 PM EST) any week day – oligos are shipped lyophilized within 7 working days or sooner
High throughput, large scale	Please contact Customer Care for turnaround time.

*For stocked modifications.

What we deliver—Value!

Free MALDI-TOF Quality Control

Bioneer is one of the few oligo producers that checks all oligonucleotides (single or high throughput orders) by MALDI-TOF and provides mass data with each oligo—free of charge. Oligos greater than 50 bases are also quality checked by gel electrophoresis.

Bioneer's Oligo Synthesis Report accompanies each oligo order. The contents of the Data Sheet include: Oligo Name, OD, total nmole, scale, length, purification, modification(s), GC content, molecular weight, and volume for 100 μ M solution.

Cat. No.	Synthesis Scale	Base Limitation	Base Price	Bio-RP	PAGE	HPLC
Tube format						
S-1001	25 nmole	15-60 mer	\$0.29	Free	-	-
S-1010	50 nmole	10-75 mer	\$0.47	Free	\$40.00	\$40.00
S-1011	200 nmole	5-110 mer	\$0.92	Free	\$59.00	\$59.00
S-1012	1 umole	5-130 mer	\$1.75	Free	\$100.00	\$100.00
S-1013	10 umole	5-50 mer	\$14.00	Free	\$280.00	\$280.00
S-1014	15 umole	5-50 mer	\$22.00	Free	\$420.00	\$420.00
Plate format						
H-1001	25 nmole	15-60 mer	\$0.17	Free	-	-
H-1010	50 nmole	10-75 mer	\$0.21	Free	\$25.00	\$20.00
H-1011	200 nmole	5-110 mer	\$0.39	Free	\$30.00	\$25.00
H-1012	1 umole	5-130 mer	\$0.94	Free	\$50.00	\$50.00
H-1013	10 umole	5-50 mer	\$7.00	Free	-	-
H-1014	15 umole	5-50 mer	\$11.00	Free	-	-

Ordering Information

Modifications for Tube Custom DNA

Modification	50 nmole	200 nmole	1 umole	10 umole
5' C6 Amine	\$24.00	\$30.00	\$50.00	\$300.00
5' Amino C12 modifier	\$45.00	\$60.00	\$100.00	\$400.00
5' Phosphate	\$20.00	\$25.00	\$45.00	\$270.00
5' Biotin	\$40.00	\$50.00	\$100.00	\$600.00
5' Biotin TEG	\$60.00	\$75.00	\$160.00	\$600.00
5' Thiol	\$125.00	\$125.00	\$195.00	\$1,170.00
5' C3 spacer	\$40.00	\$50.00	\$75.00	\$450.00
5' C6 spacer	\$60.00	\$60.00	\$85.00	\$510.00
5' C12 spacer	\$60.00	\$60.00	\$80.00	\$480.00
5' 18 atom spacer	\$50.00	\$60.00	\$90.00	\$540.00
5' dS spacer	\$47.00	\$55.00	\$80.00	\$320.00
5' 5-Methyl dC	\$50.00	\$60.00	\$90.00	\$540.00
5' 6-FAM (Fluorescein)	\$60.00	\$75.00	\$150.00	\$900.00
5' TAMRA	\$150.00	\$150.00	\$250.00	\$1,500.00
5' HEX	\$60.00	\$75.00	\$150.00	\$900.00
5' TET	\$60.00	\$75.00	\$150.00	\$900.00
5' IR700	\$80.00	\$100.00	\$200.00	\$1,050.00
5' IR800	\$80.00	\$100.00	\$200.00	\$1,050.00
3' C6 Amine	\$28.00	\$30.00	\$50.00	\$300.00
3' Phosphate	\$25.00	\$30.00	\$50.00	\$300.00
3' Biotin	\$60.00	\$75.00	\$115.00	\$690.00
3' Biotin TEG	\$60.00	\$75.00	\$100.00	\$600.00
3' Thiol	\$115.00	\$115.00	\$175.00	\$1,050.00
3' C3 spacer	\$40.00	\$50.00	\$75.00	\$450.00
3' C6 spacer	\$40.00	\$50.00	\$75.00	\$450.00
3' C12 spacer	\$60.00	\$70.00	\$90.00	\$540.00
3' C18 atom spacer	\$65.00	\$75.00	\$95.00	\$570.00
3' dS spacer	\$47.00	\$55.00	\$80.00	\$320.00
3' 5-Methyl dC	\$50.00	\$60.00	\$90.00	\$540.00
3' 6-FAM (Fluorescein)	\$60.00	\$75.00	\$150.00	\$900.00
3' TAMRA	\$85.00	\$100.00	\$150.00	\$900.00
Internal Amine	\$125.00	\$150.00	\$225.00	\$1,350.00
Internal Biotin	\$175.00	\$175.00	\$275.00	\$1,650.00
Fluorescein dT	\$175.00	\$195.00	\$275.00	\$1,650.00
Internal C3 spacer	\$40.00	\$50.00	\$75.00	\$450.00
Internal C6 spacer	\$50.00	\$60.00	\$90.00	\$540.00
Internal C12 spacer	\$50.00	\$60.00	\$90.00	\$540.00
Internal 18 atom spacer	\$50.00	\$60.00	\$90.00	\$540.00
Internal dS spacer	\$47.00	\$55.00	\$80.00	\$320.00
Internal 5-Methyl dC	\$50.00	\$60.00	\$90.00	\$540.00
Inosine	\$8.00	\$10.00	\$15.00	\$90.00

Modifications for Tube Custom DNA

Modification	50 nmole	200 nmole	1 umole	10 umole
8-Oxo-dA	\$145.00	\$175.00	\$240.00	\$1,200.00
8-Oxo-dG	\$145.00	\$175.00	\$240.00	\$1,200.00
Phosphorothioate (per insertion)	\$3.50	\$3.50	\$5.00	\$30.00
Deoxy Uridine	\$8.00	\$10.00	\$15.00	\$90.00
5-Bromo dU	\$70.00	\$90.00	\$130.00	\$600.00
5' FAM_3' TAMRA	\$180.00	\$250.00	\$400.00	\$2,400.00
5' HEX_3' TAMRA	\$180.00	\$250.00	\$400.00	\$2,400.00
5' TET_3' TAMRA	\$180.00	\$250.00	\$400.00	\$2,400.00
5' FAM_3' DABCYL	\$325.00	\$325.00	\$500.00	\$3,000.00
5' TAMRA_3' DABCYL	\$400.00	\$400.00	\$570.00	\$3,420.00
5' HEX_3' DABCYL	\$325.00	\$325.00	\$500.00	\$3,000.00
5' TET_3' DABCYL	\$325.00	\$325.00	\$500.00	\$3,000.00

Extendamers, Synthesis and Purification

Product Description	DNA Extender, BIO-RP	DNA Extender, PAGE
Cat. No.	S-2044	S-2045
Length Range	130 - 200 bases	130 - 200 bases
Guaranteed Yield	3-4 nmole	0.25 - 0.3 nmole
Turnaround Time	5 - 6 days	7 - 8 days
Base Price	\$ 0.95	\$ 0.95
Purification Price US\$	Free	\$ 75.00

Modifications

Product Description	5' Phosphate	5' Biotin	5' Amine	5' Fluorescein	5' TAMRA	Inosine
Price US\$	\$25.00	\$48.00	\$25.00	\$67.00	\$150.00	\$8.00

For additional modifications or pricing on modified oligos in plates, please email support@bioneer.us.com.

How to order online:

1. Visit our website at <http://us.bioneer.com>
2. Click on Products
3. Select Order from the drop down menu
4. Click *Oligo – Plate Order Online* or *Oligo – Tube Order Online*

Using order form

1. Go to Products > Order
2. Click on Download Form
3. Complete the form and save it to your hard drive
4. Email the completed form to order.usa@bioneer.us.com.

BIONEER, INC.

1000 Atlantic Avenue
Alameda, CA 94501-1147 USA
Toll Free : (877) 264 - 4300
Fax : (510) 865 - 0350
Email : order.usa@bioneer.us.com
Support: support@bioneer.us.com

BIONEER CORPORATION

49-3 Munpyeong - dong, Daedeok - gu
Daejeon 306 - 220 South Korea
Phone: 82-42-930-8777
Fax : 82-42-930-8688

www.bioneer.com

BIONEER
Innovation • Value • Discovery