# Premium Oligonucleotide Synthesis

**QUALITY • CONSISTENCY • CONFIDENCE**

**Gene Link oligos are for demanding applications and consistent results. We believe that investigators who value time and have no room for an experiment to fail due to oligo quality should consider Gene Link. Our numerous quality control steps for each oligo assure confidence.**

GOLD STANDARD

## Actual Gel Photo

An actual gel photo of each oligo is affixed on the oligo report. An absolute testimony of quality. Gene Link has raised the standard since inception over a decade ago. *We have the pictures to prove it!*

## Superior to "Mass-Produced Factory Oligos"

Gene Link is not an oligo factory. Each oligo is synthesized, processed and quality assured to Gene Link's absolute standards. This includes coupling efficiency monitoring of each base during synthesis and electrophoretic analysis of each oligo on a polyacrylamide gel to visually assess quality.

## Coupling Efficiency

We maintain a coupling efficiency threshold of greater than 99.5% for all oligos by using premium reagents of exacting specifications, membrane synthesis, state-of-the-art instruments and optimized software-driven protocols. This may not be evident when comparing short oligos, as PCR and sequencing reactions are very robust and can tolerate up to 50% failure/truncated sequence oligos. However, you are clearly taking a chance by using long oligos synthesized at anything below 99.5% coupling efficiency.

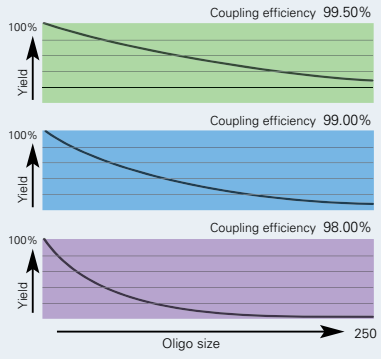
## Trityl Monitoring

All Gene Link DNA synthesizers are equipped with trityl monitors for monitoring coupling efficiency of each added base. The instruments are programmed to halt when it falls below the threshold.

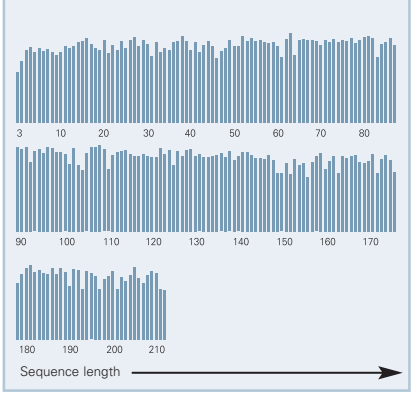
See example of routine trityl bars.

### Coupling Efficiency and Full Length Oligo Yield

| Oligo Size | 99.50% | 99.00% | 98.00% |
|---|---|---|---|
| 20 | 90.916 | 82.617 | 68.123 |
| 40 | 82.243 | 67.573 | 45.48 |
| 60 | 74.398 | 55.268 | 30.363 |
| 80 | 67.301 | 45.204 | 20.27 |
| 100 | 60.881 | 36.973 | 13.533 |
| 120 | 55.074 | 30.24 | 9.034 |
| 140 | 49.821 | 24.734 | 6.031 |
| 160 | 45.068 | 20.23 | 4.027 |
| 180 | 40.769 | 16.546 | 2.688 |
| 200 | 36.88 | 13.533 | 1.795 |
| 220 | 33.36 | 11.07 | 1.19 |
| 240 | 30.18 | 9.05 | 0.8 |
| 250 | 28.7 | 8.19 | 0.65 |




### Routine Trityl Coupling Efficiency




Actual trityl coupling efficiency of a 210 mer.

## The Gene Link Advantage

- Stringent Quality Control Measures
- Specializing in Long Oligos up to 250 mer
- Trityl Monitoring of All Oligos
- Polyacrylamide Gel Photograph of Each Oligo
- All Modifications Available
- All Oligo Types Available
- Easy Online Ordering System
- Online Design and Analysis Tools
- Knowledgeable Technical Support
- Personalized, Friendly Customer Service

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### Long Oligos

Ask our competitors how often they synthesize 200 to 250 mer oligonucleotides. Gene Link specializes in long oligos.

*You are invited to compare.*

## Oligo Scale of Synthesis and Typical Yield

| | Crude Desalted | | | RPC Purified** | | | Gel Purified | | |
|---|---|---|---|---|---|---|---|---|---|
| | 20 mer oligo* Typical yield | | | 30 mer oligo* Typical yield | | | 50 mer oligo* Typical yield | | |
| **Scale** | **$A_{260}$ Units** | **nmols** | **mg** | **$A_{260}$ Units** | **nmols** | **mg** | **$A_{260}$ Units** | **nmols** | **mg** |
| **50 nmol** | 8-10 | 30+ | 0.2-0.3 | 4-5 | 12+ | 0.1-0.16 | NR* [1-2] | NR* [2-4] | NR* [0.03-0.06] |
| **200 nmol** | 20-25 | 80+ | 0.6-0.8 | 8-12 | 24+ | 0.26-0.4 | 4-6 | 8+ | 0.13-0.2 |
| **1 µmol** | 100-120 | 400+ | 3-4 | 40-50 | 30+ | 1.3-1.6 | 20-25 | 40+ | 0.6-0.8 |
| **Purity & Yield** | **Purity is greater than 80%** depending on oligo sequence and structure. Refer to coupling efficiency table for oligo length dependent purity and yield.<br><br>No further purification required for PCR and sequencing applications.<br><br>Gel purification recommended for oligos above 50 mer and all applications involving cloning and mutagenesis. | | | **Purity 85% to 95%** depending on oligo sequence and structure.<br><br>Yield and purity will be lower for sequences with high GC content.<br><br>Not recommended for oligos longer than 35 mer.<br><br>**RPC is reverse phase purification using a cartridge; a substitute for HPLC. | | | **Purity 98% to ~100%** depending on oligo sequence and structure.<br><br>Yield will gradually decrease as length of oligo increases. Palindromes, hairpins and high GC content oligos and oligos containing stretches of 3 or more G's induces strong secondary structure and base stacking thus decreasing purity and yield.<br><br>NR* Not Recommended | | |

*Yield of 30 µg/$A_{260}$ unit for oligos is calculated for an ~equimolar base composition. Long stretches of a single base or homopolymers will have variable yields. Example for homopolymeric 50 mer: A(50) = ~20/$A_{260}$ Unit; G(50) = ~28/$A_{260}$ Unit; T(50) = ~35/$A_{260}$ Unit and C(50) = ~39/$A_{260}$ Unit.

### Unmodified DNA Oligo Synthesis*

| Scale of Synthesis | Catalog No. | Price ($) |
|---|---|---|
| 50 nmol | 26-6400-05 | 0.90 |
| 200 nmol | 26-6400-02 | 2.00 |
| 1 µmol | 26-6400-01 | 3.75 |
| 2 µmol | 26-6400-03 | 6.50 |
| 10 µmol | 26-6400-10 | 32.00 |
| 15 µmol | 26-6400-15 | 38.00 |

*minimum charge for 15 mer applies. Please visit www.genelink.com for current list prices. Call for institutional discount pricing structure.

### Same Day Oligo*

**Design your oligos today and use them tomorrow morning!** Investigators who just can not wait order our rush service (order by 12 noon EST). We ship the same day for next early morning delivery in the US and 72 hours for most international destinations.

* Turn-around time stated is for unmodified oligos. Please inquire about purified and modified oligos

### Purification

| | | Scale of Synthesis Price ($)/purification | | | | | |
|---|---|---|---|---|---|---|---|
| **Product** | **Catalog No.** | **50 nmol** | **200 nmol** | **1 µmol** | **2 µmol** | **10 µmol** | **15 µmol** |
| Gel Purification | 26-6400-XX | 75.00 | 75.00 | 150.00 | 280.00 | 1500.00 | 1800.00 |
| Reverse Phase Cartridge | 26-6400-XX | 30.00 | 30.00 | 90.00 | 170.00 | 750.00 | 900.00 |

## Synthesis of Long Oligos

Synthesis of long oligos up to 250 mer requires greater than 99.5% coupling efficiency. This can only be attained by using reagents of exacting specifications, optimized protocols and state-of-the-art instruments. Gene Link has perfected and maintains these standards. *You are invited to compare.*

**PCR and sequencing reactions are very robust and can tolerate up to 50% failure/truncated sequence oligos.**

**However, you are clearly taking a chance by using long oligos synthesized at anything below 99.5% coupling efficiency. See the coupling efficiency table and graph.**

Gene Link specializes in long oligos. Our description of a long oligo is 180 mer to 250 mer. *You are invited to compare.*

### Purification

Crude oligo is the total yield after chemical synthesis; this contains the full-length product as well as all truncated n-1 sequences. For example, at 99% coupling efficiency the crude yield of a 70 mer is ~50% full-length and ~50% truncated sequences. Gel purification is strongly recommended for all oligos above 50 mer.

### Coupling Efficiency and Full Length Oligo Yield

| Oligo Size | 99.50% | 99.00% | 98.00% |
|---|---|---|---|
| 20 | 90.916 | 82.617 | 68.123 |
| 40 | 82.243 | 67.573 | 45.48 |
| 60 | 74.398 | 55.268 | 30.363 |
| 80 | 67.301 | 45.204 | 20.27 |
| 100 | 60.881 | 36.973 | 13.533 |
| 120 | 55.074 | 30.24 | 9.034 |
| 140 | 49.821 | 24.734 | 6.031 |
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| 200 | 36.88 | 13.533 | 1.795 |
| 220 | 33.36 | 11.07 | 1.19 |
| 240 | 30.18 | 9.05 | 0.8 |
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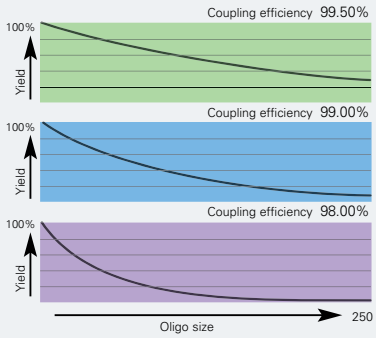



PCR and sequencing reactions are very robust and can tolerate up to 50% failure/truncated sequence oligos. However, you are clearly taking a chance by using long oligos synthesized at anything below 99.5% coupling efficiency.

### Coupling Efficiency

Chemical DNA synthesis comprises of multiple reactions to complete a cycle of the appropriate base coupling. Thus the use of reagents of exacting specifications, state-of-the-art instruments and optimized software driven protocols are necessary to maintain the highest possible coupling efficiency. This becomes enormously important when synthesizing a long oligo. Coupling efficiency of 99% or 98% seems very good but on closer examination the yield is almost half for a 40 mer! See the coupling efficiency table.

### Long Oligo Scale of Synthesis and Typical Yield

**Gel Purified**

150 mer oligo typical yield

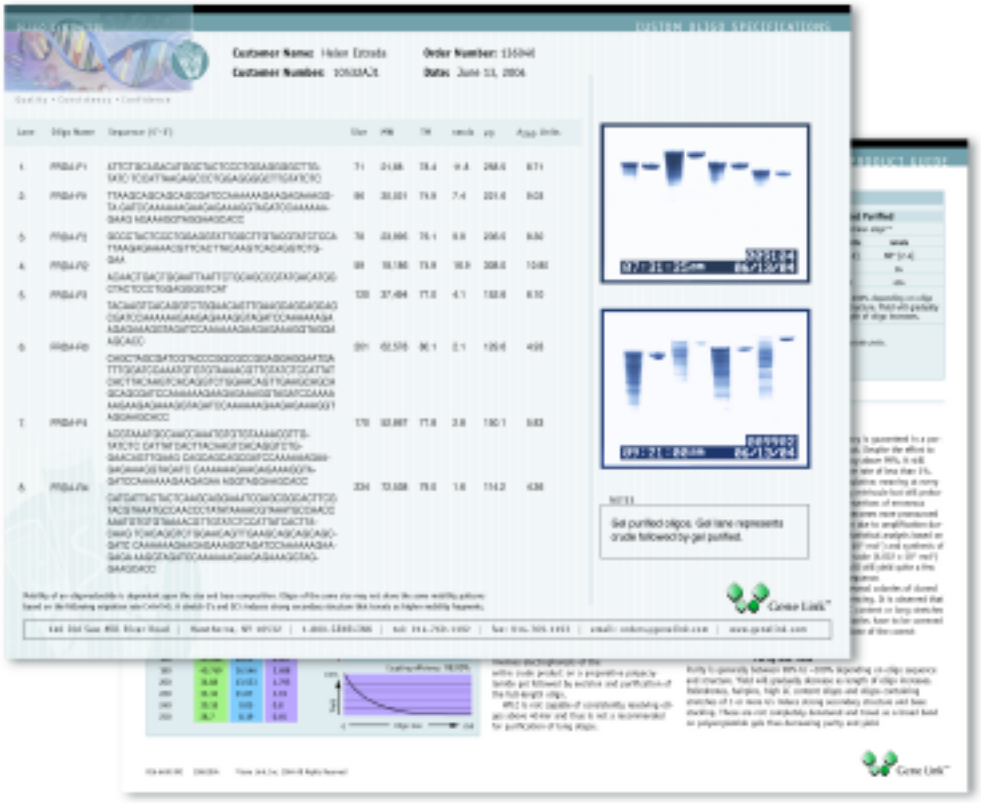
| Scale | $A_{260}$ Units | nmols | mg |
|---|---|---|---|
| 1 µmol | 4–6 | 4+ | 0.13–0.2 |
| 2 µmol | 8–12 | 8+ | 0.26–0.8 |

**Purity & Yield 98% to ~100%**
depending on oligo sequence and structure.

Yield will gradually decrease as length of oligo increases. Palindromes, hairpins and high GC content oligos and oligos containing stretches of 3 or more G's induces strong secondary structure and base stacking thus decreasing purity and yield.

### Oligo Size and Purification Recommendations

| Scale | Synthesis Scale | Recommended Purification |
|---|---|---|
| 1-49 mer | 50 nmol | No purification required. Purification dependent upon desired application. |
| 50-99 mer | 200 nmol | Gel purification |
| 100-199 mer | 1 µmol | Gel purification |
| 200-250 mer | 2 µmol | Gel purification |



## Purity and Yield

Gel purified oligo purity is generally between 98% to ~99.9% depending on oligo sequence and structure. Yield will gradually decrease as oligo length increases. Palindromes, hairpins, high GC content oligos and oligos containing stretches of 3 or more G's induce strong secondary structure and base stacking. These are not completely denatured and travel as broad bands on a polyacrylamide gel thus decreasing purity and yield.

## Unmodified DNA Oligo Synthesis*

| Scale of Synthesis | Price ($)/base |
|---|---|
| 200 nmol scale | 2.00 |
| 1 µmol scale | 3.75 |
| 2 µmol scale | 6.50 |

*minimum charge for 15 mer applies. Please visit www.genelink.com for current list prices. Call for institutional discount pricing structure.

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## Purification

**All Gene Link oligos shorter than 40 mer usually do not require any further purification if the application is for PCR or sequencing. Gene Link recommends purification of oligos longer than 50 mer and all oligos destined to be cloned.**

| | Scale of Synthesis Price ($)/purification | | | | | |
|---|---|---|---|---|---|---|
| Product | 50 nmol | 200 nmol | 1 µmol | 2 µmol | 10 µmol | 15 µmol |
| Gel Purification | 75.00 | 75.00 | 150.00 | 280.00 | 1500.00 | 1800.00 |