

## Product Information

### Deoxyribonucleic acid, single stranded from human placenta

Catalog Number **D3287**

Storage Temperature -20 °C

Synonym: DNA

$\lambda_{\text{max}}$ : 259 nm (100 mM phosphate buffer, pH 7.0)

#### Product Description

This product is a sonicated DNA from human placenta. Sonication shears the large molecular weight DNA to produce fragments in a size range of 587 to 831 base pairs. This range has been shown to be the most effective for hybridizations. The material is monitored during sonication by electrophoresis in order to determine the size range. Once sonication is complete, the material is denatured by boiling. This DNA is used for hybridization to block non-specific binding of probes to membranes.<sup>1,2</sup> DNA from human placenta is 41.9 mole % G-C and 58.1 mole % A-T.<sup>3</sup> An absorbance of 1.0 at 260 nm corresponds to approximately 50 µg of double-stranded DNA.<sup>4</sup>

The structure of deoxyribonucleic acid (DNA) was reported in 1953 by Crick and Watson based upon x-ray diffraction studies.<sup>5-7</sup> This description is the basis for modern molecular biochemistry and has been consistent with subsequent discoveries of RNA and protein biosynthesis. DNA was described as a double helix of a chain of nucleotides. Each nucleotide consists of a central carbohydrate moiety, 2'-deoxyribose, attached to a phosphate group on the 5-position and a base, either purine or pyrimidine, attached at the 1-position. The phosphate group is connected to the 3-position of the deoxyribose of the next nucleotide in the polymer. The sugar phosphate chain is external while the bases are internal and have a unique (complementary) relationship. They are held in place by hydrogen bonding: Adenosine to Thymine (A-T) and Guanine to Cytidine (G-C). Thus, for every adenosine (or guanine) in one chain there is located a thymidine (or cytidine) in the opposing chain. DNA is principally found in the cell nucleus, although it also occurs in the mitochondrion.

The Watson-Crick structure provided a consistent basis for explaining protein synthesis. Biosynthesis of proteins occurs one amino acid at a time forming the protein chain. Each amino acid has one or more "codons" of three nucleotides that code for no other

amino acids. Protein synthesis occurs with the intermediate messenger ribonucleic acid (mRNA) as well as participation by another form of RNA, ribosomal RNA.

DNA provides the means of transmitting heritable information from one generation of cells or higher organism to the next via the gene and genome. A gene is a sequence of DNA nucleotides that specify the order of amino acids that are incorporated into a protein. A genome is the set of genes for an organism.

Recent developments include the Human Genome Project which determined the base sequence of bases of the three billion pairs of nucleotides in the nucleus of the human cell. The analysis of mutations that cause genetic disease will provide information needed to develop specific products to treat these conditions. Polymerase chain reaction technology permits amplification of miniscule amounts of DNA into amounts large enough to analyze. This is important in medicine (identifying a bacterium or virus), paleontology (identifying a fossilized organism), or forensic science (comparing DNA from a crime scene with that of a victim or suspected criminal).

Commercially available DNA from various sources can be used for standards, controls, blocking in hybridizations, and study of physical properties.

#### Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

#### Procedure

This is a ready to use concentrated solution (9-12 mg/ml DNA). However, it will reanneal on standing at room temperature so it is recommended to boil the solution for 10 minutes and then cool **on ice** for at least 5 minutes prior to use. Cooling on ice will reduce the chances for reannealing, as it is more likely to reanneal if cooled at room temperature.

## References

1. Molecular Cloning: A Laboratory Manual, 2nd ed., Sambrook, J. F., et al., Cold Spring Harbor Laboratory Press (Cold Spring Harbor, NY: 1989), pp. 9.48-9.49, 13.15.
2. Silhavy, T., et al., Experiments with Gene Fusions, (Cold Spring Harbor, NY: 1984), p.195.
3. Marmur, J., and Doty, P., Determination of the base composition of deoxyribonucleic acid from its thermal denaturation temperature. *J. Mol. Biol.*, **5**, 109-118 (1962).
4. Molecular Cloning: A Laboratory Manual, 2nd ed., Sambrook, J. F., et al., Cold Spring Harbor Laboratory Press (Cold Spring Harbor, NY: 1989), pp. E5.
5. Watson, J. D., and Crick, F. H., Molecular structure of nucleic acids; a structure for deoxyribose nucleic acid. *Nature*, **171**, 737-738 (1953).
6. Wilkins, M. H. F., et al., Molecular Structure of Deoxypentose Nucleic Acids. *Nature*, **171**, 738-740 (1953).
7. Franklin, R., and Gosling, R. G., Molecular Configuration in Sodium Thymonucleate. *Nature*, **171**, 740-741 (1953).

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