

## Product Information

### Deoxyribonucleic acid, single stranded from calf thymus

Product Number **D 8899**

Storage Temperature -0 °C

#### Product Description

CAS#: 91080-16-9

Melting Temperature ( $T_m$ ): 87 °C<sup>1</sup>

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

Synonym: DNA

This product is a single stranded form. It is prepared by a treatment at pH 12.5 followed by lowering the pH to 8.5 and ethanol precipitation. It is prepared from male and female calf thymus tissue. DNA from calf thymus is 41.9 mole % G-C and 58.1 mole % A-T.<sup>1</sup> An absorbance of 1.0 at 260 nm corresponds to approximately 50  $\mu$ g of double-stranded DNA.<sup>2</sup>

The structure of deoxyribonucleic acid (DNA) was reported in 1953 by Crick and Watson based upon x-ray diffraction studies.<sup>3,4,5</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 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

For Laboratory Use Only. Not for drug, household or other uses.

#### Preparation Instructions

To prevent shearing of the large genomic DNA, this product should be dissolved in water (1 mg/ml) with no sonication or stirring. Gentle inversion overnight at 0 - 4 °C is recommended to completely solubilize the DNA. The presence of 1 mM EDTA is recommended to prevent nucleases from degrading the DNA.

#### Storage/Stability

Solutions of DNA have been stored successfully for several months at 4 °C, in 10 mM Tris, pH 7.5 - 8.0, with 1 mM EDTA and without a bacteriostatic agent. At low concentrations (25  $\mu$ g/ml), DNA tends to absorb onto the surfaces of plastic tubes.

It is not recommended to store DNA in alkaline solutions since DNA tends to degrade at pH greater than 8.0.

#### References

1. 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).
2. *Molecular Cloning: A Laboratory Manual*, 2nd ed., Sambrook, J. F., et al., Cold Spring Harbor Laboratory Press (Cold Spring Harbor, NY: 1989), pp. E5.
3. Watson, J. D., and Crick, F. H., Molecular structure of nucleic acids; a structure for deoxyribose nucleic acid. *Nature*, **171**, 737-738 (1953).
4. Wilkins, M. H. F., et al., Molecular Structure of Deoxypentose Nucleic Acids. *Nature*, **171**, 738-740 (1953).
5. Franklin, R., and Gosling, R. G., Molecular Configuration in Sodium Thymonucleate. *Nature*, **171**, 740-741 (1953).

FEB/NSB 12/03

Sigma brand products are sold through Sigma-Aldrich, Inc.

Sigma-Aldrich, Inc. warrants that its products conform to the information contained in this and other Sigma-Aldrich publications. Purchaser must determine the suitability of the product(s) for their particular use. Additional terms and conditions may apply. Please see reverse side of the invoice or packing slip.