

Nucleic acids

[Science](#), [Genetics](#)



DNA is the single most important molecule found within cells. It is a stable polynucleotide, which contains coded information for inherited characteristics. It is contained in chromosomes in the nucleus of an eukaryot cell. The essential features of the Watson-Crick model are summarised below.

1. The two helical polynucleotide chains are coiled around a common axis. The two chains have opposite polarity i. e. they are antiparrallel.
2. The regular repeating sugar phosphate backbone of each strand lies on the outside of the helix. The purine and pyrimidine bases project inwards at 90° to the axis of the helix.
3. The two strands are held together by hydrogen bonding between pairs of bases such that guanine always pairs with cytosine and adenine always pairs with thymine; this is called complementary base pairing
3. The diameter of the helix is 2.0 nm and adjacent bases are separated by 0.34 nm and inclined at 360° relative to each other. This means that each complete turn of the double helix contains about 10 base pairs.
4. The amount of guanine is usually equal to that of cytosine.

The monomers of RNA and DNA are called nucleotides. Each nucleotide has three parts: A Five Carbon or Pentose Sugar The sugar will be one of two very similar pentose rings. Ribonucleic acids contain the sugar ribose. Deoxyribonucleic acids contain the sugar deoxyribose. The only difference between these two sugars is that deoxyribose contains one oxygen atom less than ribose. Pentose sugars are essential because they are involved in linking different nucleotides together by condensation reactions.

The Nitrogen-Containing Bases There are two types of bases found in nucleic acids. The purine bases have two nitrogen containing rings, while the pyrimidines have only one. In DNA the purines are adenine (A) and guanine (G) and the pyrimidines are

cytosine (C) and thymine (T). In RNA the purine bases are the same as in DNA, but the pyrimidines are cytosine and uracil (U). These rings have the chemical property of being bases because of the nitrogen atoms they contain. Adenine always forms 2 hydrogen bonds with thymine. Cytosine always forms 3 hydrogen bonds with guanine. Phosphate Group The phosphate group gives nucleotides, and the nucleic acids that they make up, their acidic character. The phosphate group is chemically reactive and allows new groups to be added by condensation reactions. More complex strands can be built up, and the nucleotides can be linked together to form a polynucleotide chain. These three components when joined form a nucleotide: The three parts of a nucleotide monomer are joined by condensation reactions. Two molecules of water are removed in the process.