For example, DNA molecules with greater G+C content have higher Tm values as shown in Fig 4.24.

This effect can be explained by two factors.

One factor is the greater number of H-bonds between G-C base pairs than between A-T base pairs. A higher temperature will therefore be required to break G-C base pairs than A-T base pairs.

A second factor is that G-C base pairs appear to form stronger van der Waals interactions between adjacent base pairs (called stacking interactions) than A-T base pairs.

Table 24.2 shows stacking energies for ten possible stacked dimers derived from melting curves of synthetic DNA molecules. The free energies of formation are most favorable for G-C base pairs.

The more negative the free energy, the more favorable is the interaction.

The salt concentration also affects the melting temperature. Higher salt concentration increases the Tm, i.e., stabilizes the double helix.

Salt cations are thought to reduce the repulsion between chains by neutralizing the negative charge on the phosphate groups-

At very low salt concentrations DNA will unwind due to repulsion of the phosphate groups.

Lastly lets consider the structure of ribonucleic acid (RNA).

RNA is a linear polymer of four ribonucleotides. The structure of one such ribonucleotide is shown in Fig 21.4.

Also shown in Fig 21.3 are the corresponding structures of the ribonucleosides.

Note that the sugar component is ribose for which the 2' carbon has a OH group.

Secondly note that there are two purines, adenine and guanine, as in DNA and two pyrimidines, cytosine and uracil. The uracil replaces thymine.

Note that thymine and uracil differ by a methyl group at carbon 5.

The ribonucleotides are linked together by phosphodiester bonds (as in DNA) as shown in Fig 22.24.

RNA typically exists as a single stranded structure rather than as a double helix.

Single strands of RNA do exhibit base pairing involving self-complementary regions in the molecule as shown in Fig 4.17.

This intra strand base pairing is well known for transfer-RNAs as shown in Fig 4.22.

In base pairing, adenine (A) is H-bonded uracil (U) and guanine (G) to cytosine (C).

The folding of this RNA into a well ordered three dimensional structure is referred to as the tertiary structure.

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