

Chemistry 2, HW 27

There are two types of nucleic acids, deoxyribonucleic acid (**DNA**) and ribonucleic acid (**RNA**). Both are polymers, the repeating units are known as **nucleotides**.

The **bases** in nucleic acids are derivatives of pyrimidine or purine. In DNA there are **adenine, guanine, cytosine and thymine**. In RNA instead of thymine we have **uracil**.

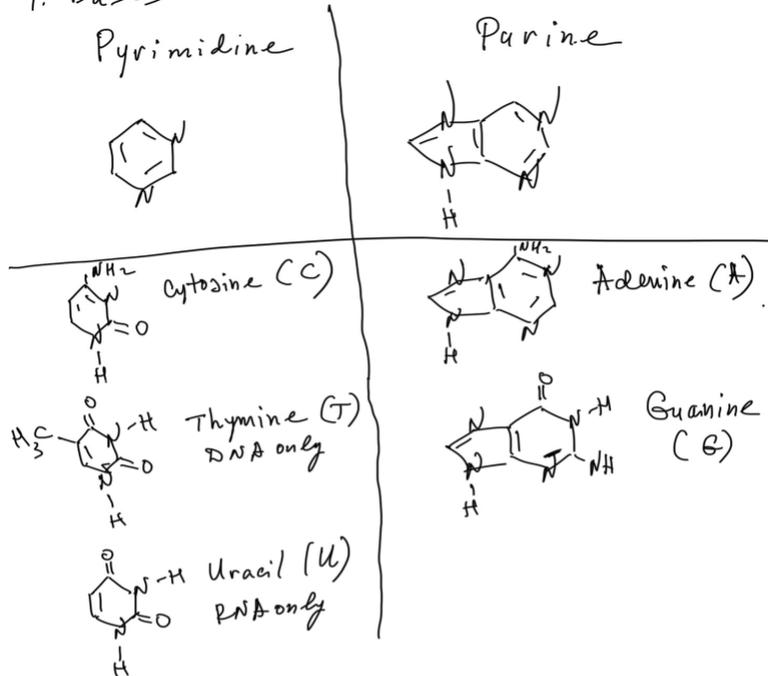
In RNA we have five-carbon sugar – **ribose**. The atoms there are numbered **1', 2', 3', 4', 5'** to differentiate them from the atoms in the bases.

In DNA we have **deoxyribose**.

A **nucleoside** is formed when a base forms a bond to C1' of a sugar.

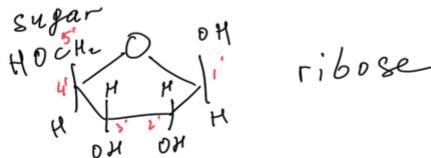
A **nucleotide** is formed when phosphate group is added to C5' atom.

1. Bases

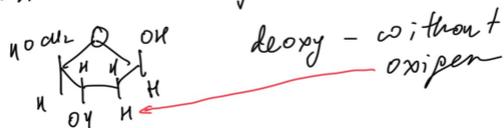


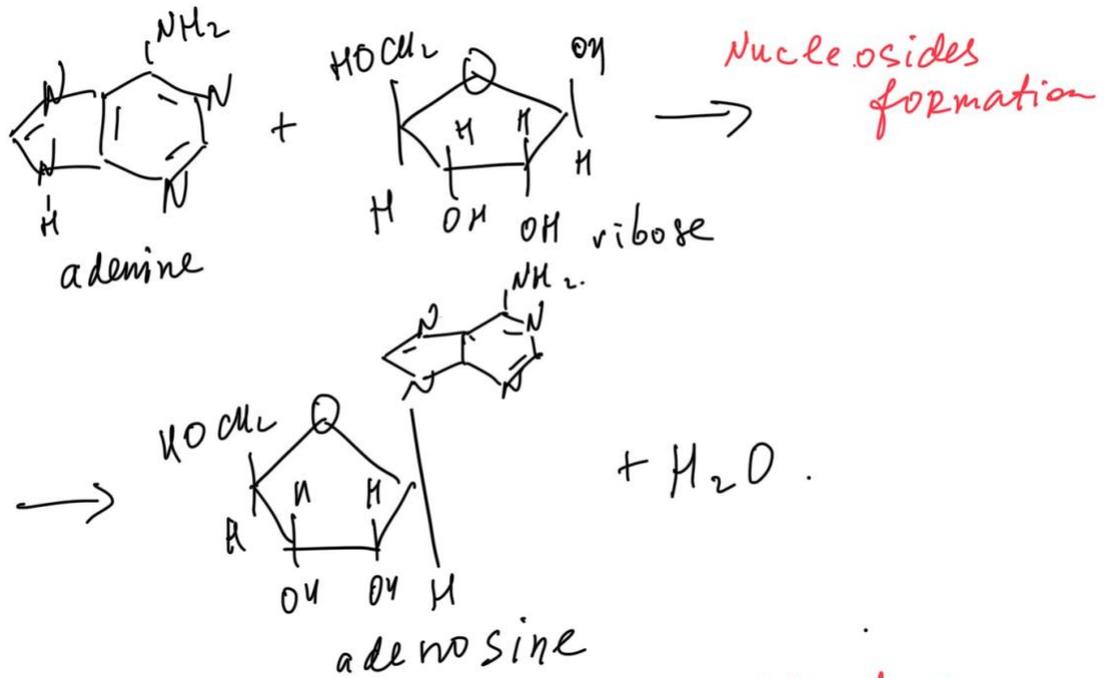
2. Sugars

RNA has ribose, the 5 carbon sugar

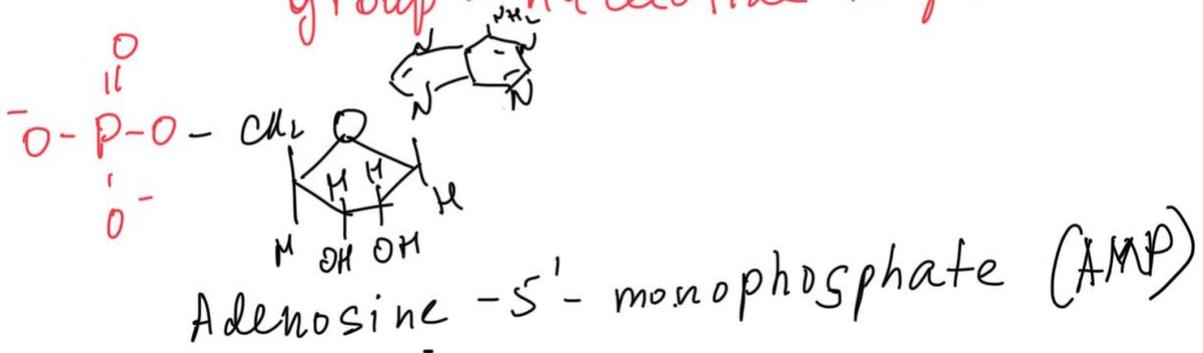


DNA has deoxyribose





When nucleoside adds phosphate group - nucleotide is formed



Names of nucleosides and nucleotides in RNA and DNA

	Base	Nucleosides	Nucleotides
RNA	Adenine (A)	Adenosine (A)	Adenosine-5'-monophosphate (AMP)
	Guanine (G)	Guanosine (G)	Guanosine -5'-monophosphate (GMP)
	Cytosine (C)	Cytidine (C)	Cytidine -5'-monophosphate (CMP)
	Uracil (U)	Uridine (U)	Uridine -5'-monophosphate (UMP)
DNA	Adenine (A)	Deoxyadenosine (A)	Deoxyadenosine -5'-monophosphate (dAMP)
	Guanine (G)	Deoxyguanosine (G)	Deoxyguanosine-5'-monophosphate (dGMP)
	Cytosine (C)	Deoxycytidine (C)	Deoxycytidine -5'-monophosphate (dCMP)
	Thymine (T)	Deoxythymidine (T)	Deoxythymidine -5'-monophosphate (dTMP)

Complimentary base pairs AT, GC – genetic code. The code from DNA is transferred to RNA, and then translated to amino acid sequence of a protein (three letter code – one amino acid, for example CAC is a code for amino acid Histidine).

Questions:

1. Identify the sugar and base in the following nucleotides: dTMP, CMP, AMP, dGMP
2. Identify similarities and differences in the primary structure of DNA and RNA.