

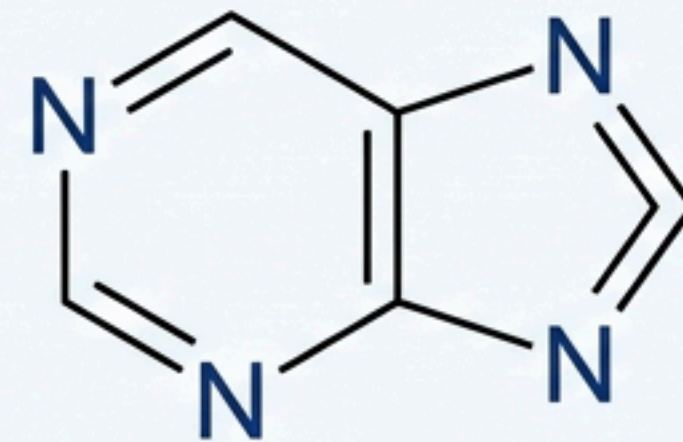
The Units That Build DNA and RNA



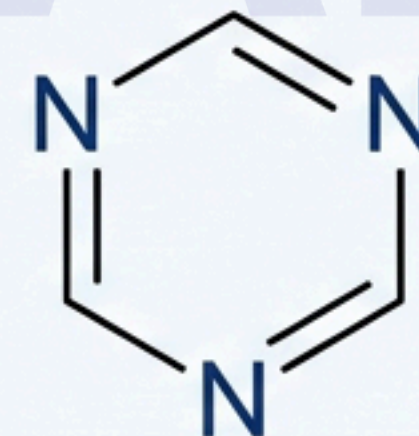
The Foundational Unit is a Nitrogenous Base

Heterocyclic Compound

In the context of biological carbon compounds, living organisms contain several essential heterocyclic rings containing nitrogen. These nitrogen-rich rings form the absolute foundation of our genetic architecture.

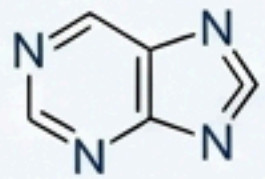


PURINE SKELETON

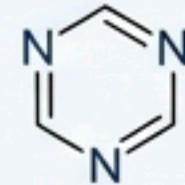


PYRIMIDINE SKELETON

Adenine, Guanine, Cytosine, Uracil, Thymine



Purines (Double Ring)



Pyrimidines (Single Ring)

Adenine
Guanine

Cytosine
Thymine
Uracil

Polymer Association

DNA and RNA utilize different pyrimidines. Thymine is found strictly in DNA, whereas Uracil is found strictly in RNA.



**You've Learned the Theory.
Let's Test Them Now.**

$$E=mc^2$$



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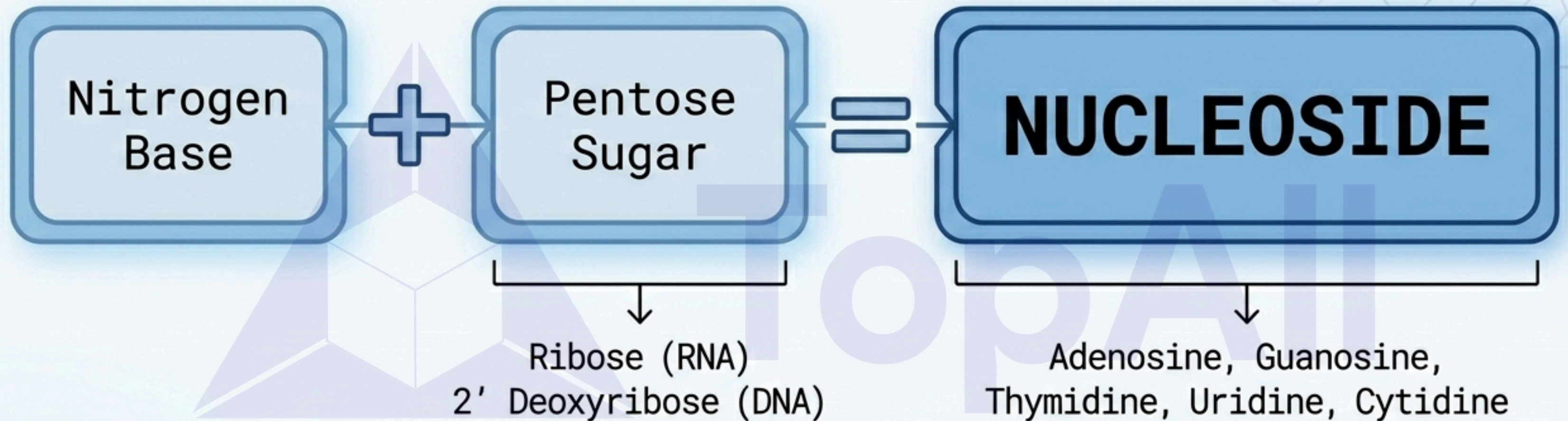
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Key Highlights

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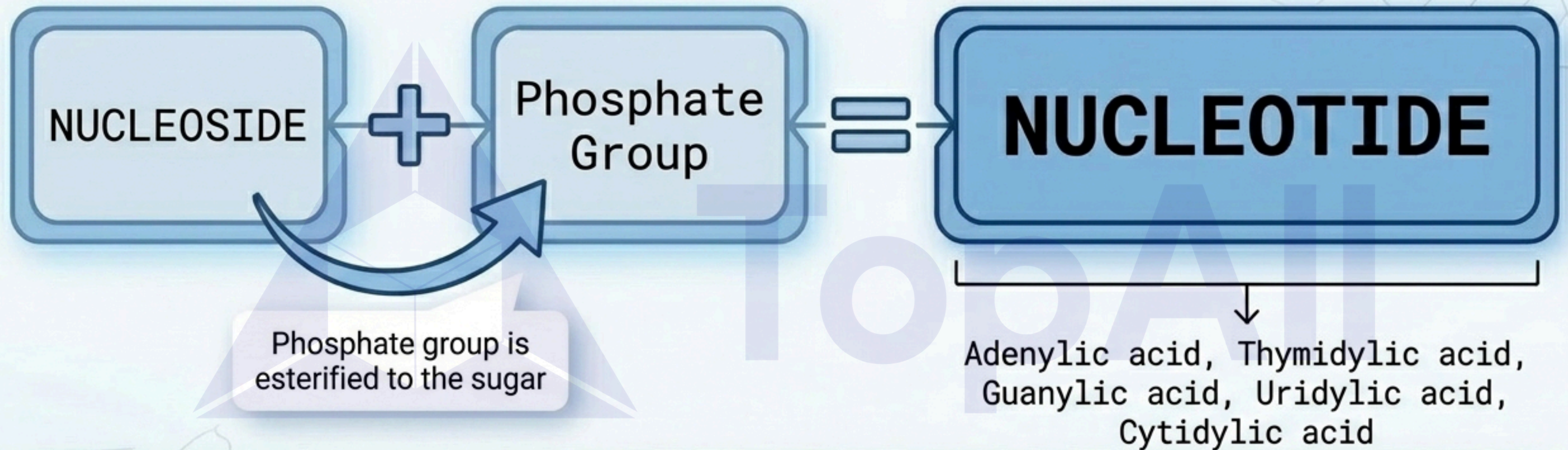
Base + Sugar = Nucleoside



Do Not Confuse

Nomenclature Warning: Adenine is the fundamental nitrogenous base. Adenosine is the nucleoside formed when Adenine attaches to a sugar.

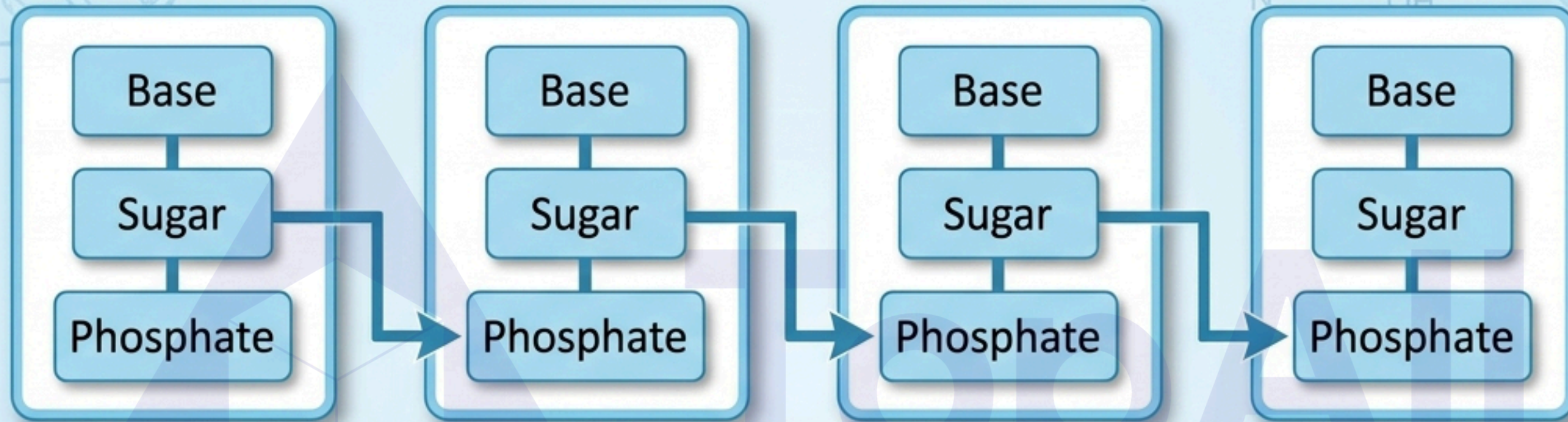
Base + Sugar + Phosphate = Nucleotide



Key Takeaway

The Acidic Transformation: The esterification of the phosphate group is what turns the molecule into an acid. This is why nucleotide names frequently end in 'acid' (e.g., adenylic acid).

DNA and RNA as Nucleotide Polymers



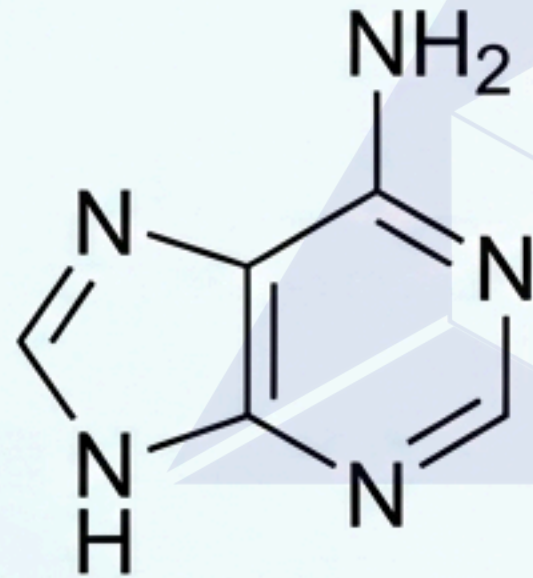
Nucleic acids (DNA and RNA) consist exclusively of these repeating nucleotide units. Because they are polynucleotides, they are capable of serving as the **genetic material** for living organisms, carrying hereditary information passed from parent to progeny.

Micromolecule vs. Macromolecule

Individual nucleotides are micromolecules (acid-soluble, <1000 Da). However, when linked into nucleic acids, they form true **biomacromolecules** found in the **acid-insoluble** fraction of living tissue.

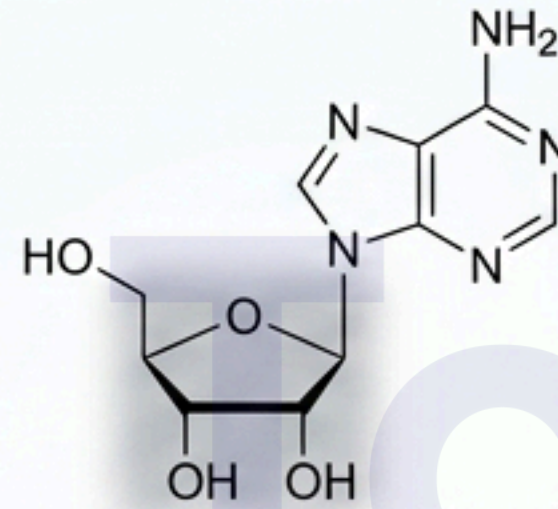
The Structural Progression: From Base to Nucleotide

1. Nitrogenous Base

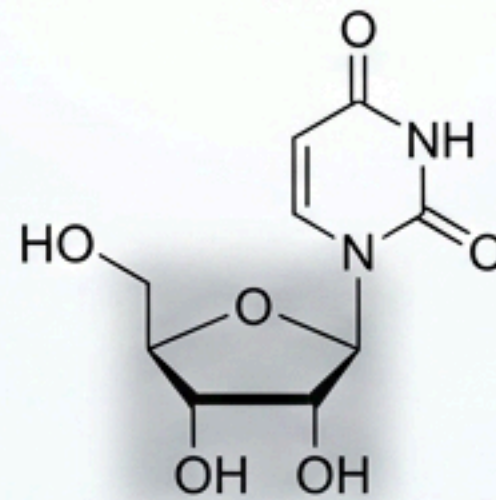


Adenine (Purine)

2. Nucleoside

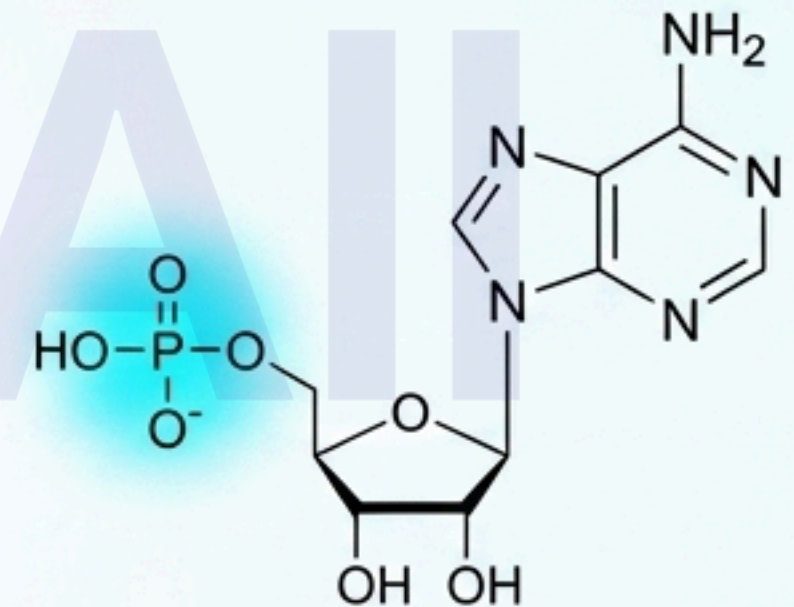


Adenosine



Uridine

3. Nucleotide



Adenylic Acid



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