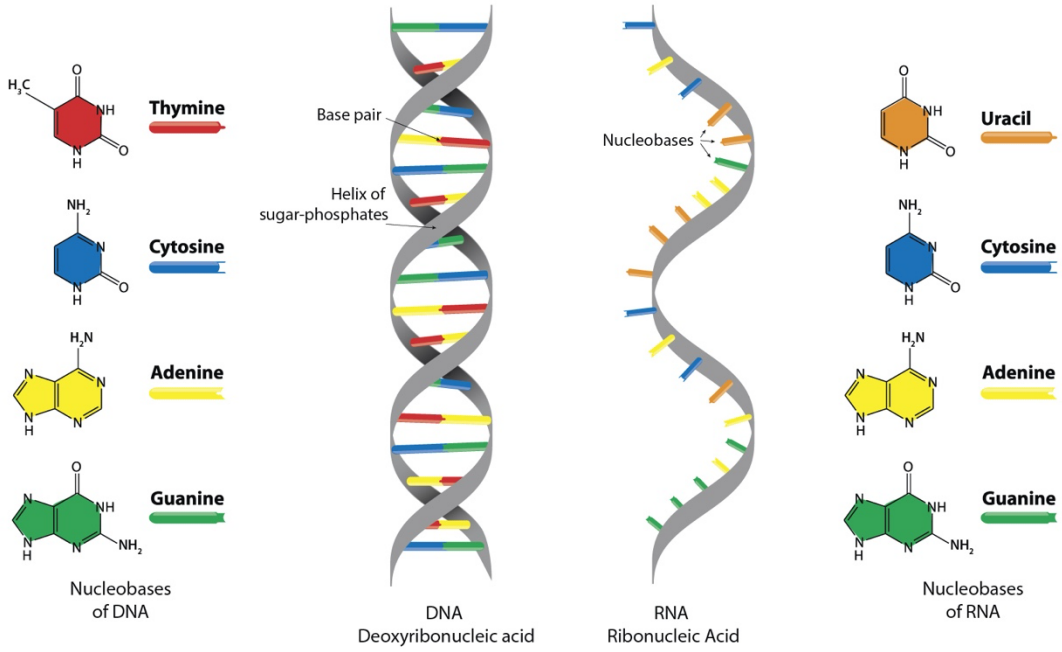
GRANT AGREEMENT NO 2019-1-PT01-KA203-061449
ERASMUS+ PROGRAMME – KA2 – STRATEGIC PARTNERSHIP

HYBRID
LAB NETWORK

General precautions when handling RNA

The objective of this step is to know safety laboratory measurements and tips for avoid RNase contamination.

RNA (ribonucleic acid) and DNA (deoxyribonucleic acid) are polymeric molecules made up of nucleotides (ribonucleosides and deoxyribonucleoside, respectively). (Fig 1; Fig 2; Fig 3)



(Double-stranded) (Single-stranded)

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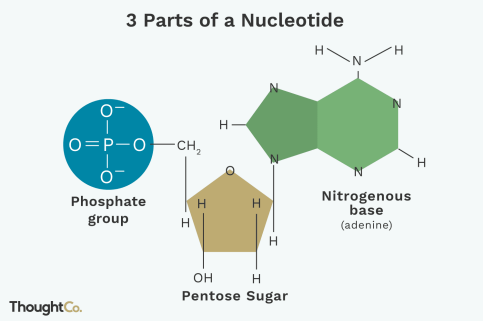
Fig 1. "DNA vs. RNA. DNA (short for deoxyribonucleic acid) - long, double-stranded and spiral-shaped molecule inside most living cells that carries genetic instructions." https://www.technologynetworks.com/genomics/lists/what-are-the-key-differences-between-dna-and-rna-296719

NUCLEOTIDES



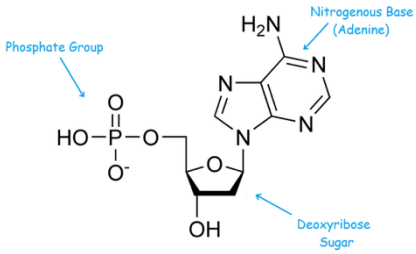


Fig 2. DNA (short for deoxyribonucleic acid). DNA is a polymeric molecules made up of nucleotides A long, double-stranded and spiral-shaped molecule inside most living cells that carries genetic instructions. It is built on a backbone of phosphorus, oxygen, and carbon atoms. In all living things, from plants and animals to microbes, these instructions tell cells which molecules to make.

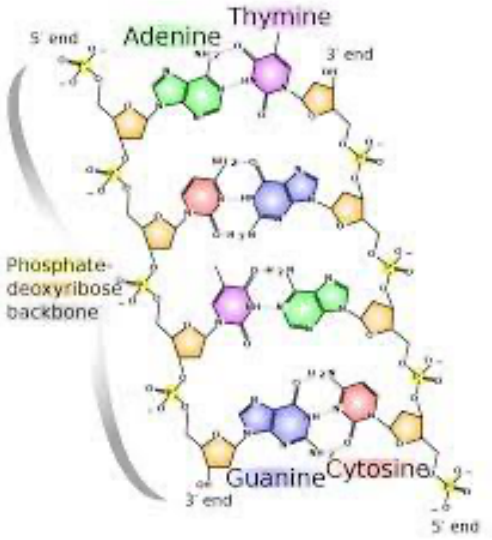


Fig3. DNA is a polymeric molecule made up of nucleotides. https://upload.wikimedia.org/wikipedia/commons/thumb/e/e4/DNA_chemical_structure.svg/700px-DNA_chemical_structure.svg.png

In contrast to the double-stranded DNA, RNA is a single-stranded polynucleotide (Fig 1) and, therefore, highly susceptible to degradation, both due to its chemical instability and because of the ubiquitous presence of the Ribonucleases (commonly abbreviated as RNases), which degrade RNA.

A miniscule amount of RNase contamination in an RNA sample is sufficient to destroy the RNA in the sample. Additionally, unlike the DNA-degrading Deoxyribonucleases (abbreviated as DNases) which require metal ions to be active (e.g., Mg^{2+}), RNases have no requirement for metal ions and can maintain activity even after prolonged boiling or autoclaving.

Typically, the major sources of RNase contamination in a typical laboratory include: contaminated solutions/reagents and exposure to RNase from environmental sources (lab surfaces, aerosols, ungloved hands, etc.

RNase contamination can be avoided by following common sense precautions, including:

a. **Wear clean gloves and a lab coat;**

b. **Always change gloves after contact with potentially contaminated surfaces such as skin, hair, doorknobs, computer keyboards, etc.;**

c. **Use dedicated, RNase-free filter pipette tips and microfuge tubes, as well as RNase-free solutions. Avoid non-disposable plastic and glassware;**

RNase-free filter pipette
https://m.made-in-china.com/product/Dnase-Rnase-Free-Filter-Tips-Pipette-with-CE-Sterilized-Pipette-Tips-Rack-Box-High-Levels-of-Accuracy-1909238525.html

Microfuge tubes
https://brandtech.com/product/0-5ml-microcentrifuge-tubes/

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RNase-free solutions
https://www.thermofisher.com/order/catalog/product/AM9763

d. Clean work area thoroughly and maintain a separate area for RNA work;

e. Keep tubes and bottles closed whenever possible, and avoid coughing, sneezing, or breathing over open containers; and

f. Keep RNA samples on ice, and store purified RNA at -80°C to avoid degradation.