

The best tools for DNA and RNA quantification

What is nucleic acid quantification (NAQ)?

Sample Preparation

DNA/RNA Purification

DNA/RNA Quantification

Downstream Application e.g. PCR

Data Analysis

NAQ determines the concentration of DNA or RNA in a sample, enabling the calculation of the correct amount of nucleic acid required for downstream applications.

Why perform NAQ?

Using the correct amount of nucleic acid saves time and money, preventing downstream experimental failures.

Downstream applications include:

Cloning, NGS, qPCR, Ligation, PCR, Transfection, Microarrays, Sanger sequencing

In PCR techniques:

- Too little NA can result in failure to amplify the target
- Too much NA used can lead to non-specific amplification

Note: MIQE guidelines require input NA quality and purity to be reported in publication.

MIQE - [Minimum information for publication of quantitative real-time PCR experiment](#)

In NGS:

- Accurate quantification of NA prior to library prep helps obtain high-quality reading data
- Insufficient NA will result in low sequencing efficiency
- NA overabundance will result in poor quality data

Things to consider when selecting a tool

Sensitivity



What quantity ranges do you expect?

Throughput



How many samples do you process per week?

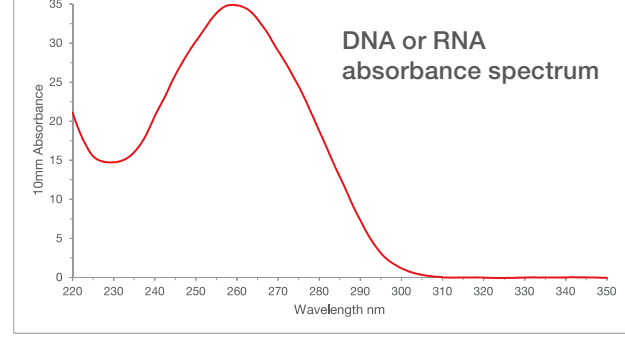
How many samples do you quantify at a time?

Technologies used in NAQ



Absorbance – UV-Vis

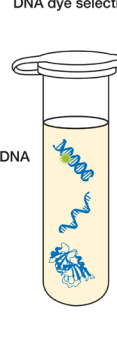
Provides concentration of nucleic acid and protein by measuring the **amount of light** that it absorbs.



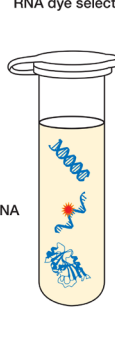
Fluorescence

In a fluorometric assay, **dyes bind** selectively to DNA, RNA, or protein of interest.

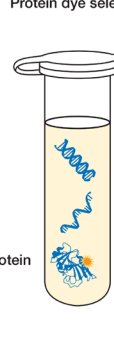
DNA dye selectivity



RNA dye selectivity



Protein dye selectivity



How to select the most suitable technology

Absorbance

Benefits	Limitations
Simple	Limited selectivity
Purity	Limited sensitivity
Contaminant information	

Fluorescence

Benefits	Limitations
Specific	Requires reagents and standards
Sensitive	No purity identification
Accurate	



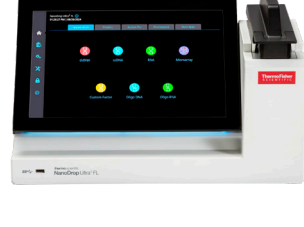
Did you know?

If **absorbance - blank \leq 9X instrument precision** (see instrument specifications), you cannot rely on the measurement.

In this case switching to fluorescence will improve your result.

How solutions from Thermo Fisher Scientific could help you

Absorbance – UV-Vis



Thermo Scientific™ NanoDrop™ Ultra and UltraC Spectrophotometers

Only 1-2 μ L sample needed for accurate quantification of one sample at a time

Thermo Scientific™ NanoDrop™ Eight Spectrophotometer

Quantifies 8 samples at a time for improved productivity

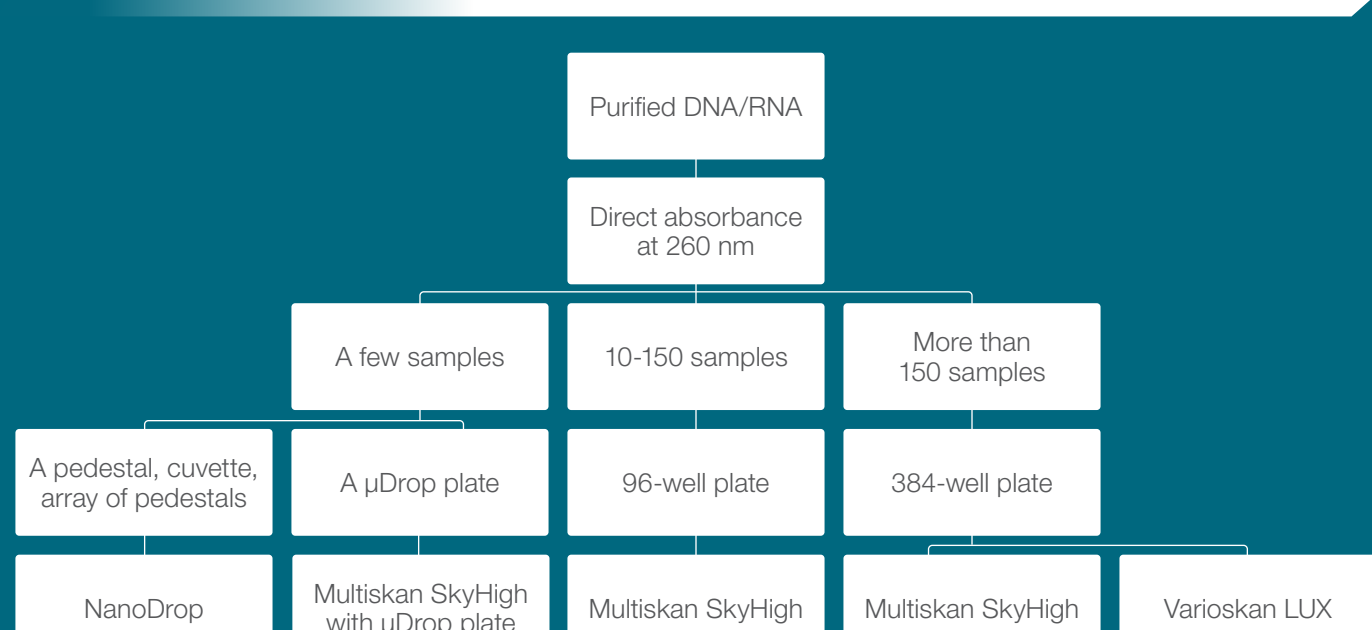
Thermo Scientific™ Multiskan™ Sky-High Microplate Spectrophotometer

Offers high throughput and sample flexibility using 96–384-well plates, cuvettes, or the Thermo Scientific™ μ Drop™ Plate

Thermo Scientific™ Varioskan™ LUX Multimode Microplate Reader

Versatile for both photometric and fluorescence quantification and offers increased flexibility addressing diverse research needs in laboratories

Increase throughput



Fluorescence*



Invitrogen™ Qubit™ 4 Fluorometer

Sensitivity and specificity one sample at a time

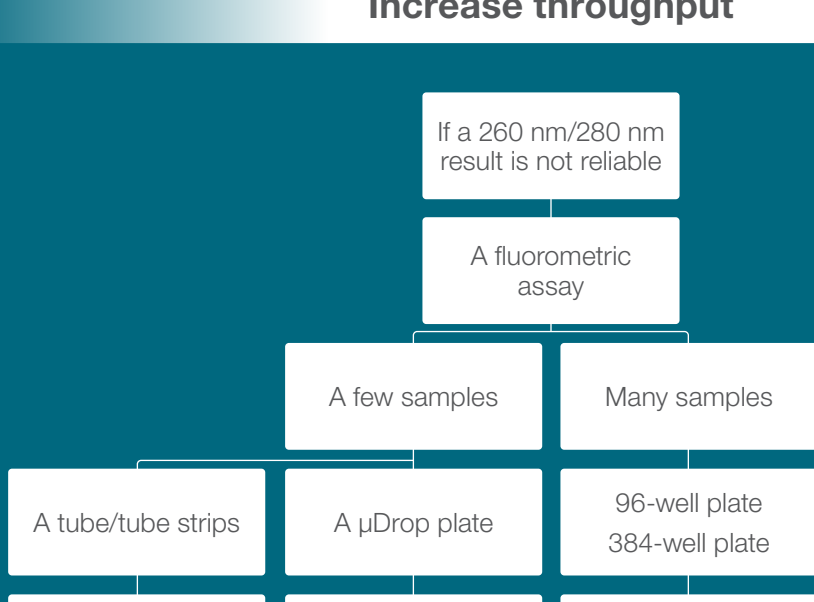
Invitrogen™ Qubit™ Flex Fluorometer

Quantifies 8 samples with high sensitivity, accuracy and precision

Thermo Scientific™ Varioskan™ LUX Multimode Microplate Reader

Versatile for both photometric and fluorescence quantification and offers increased flexibility addressing diverse research needs in laboratories

Increase throughput



*For fluorescent NA quantification, the Qubit reagents are available for Qubit instruments, and the Invitrogen™ Quant-IT™ reagents for Varioskan LUX microplate readers.