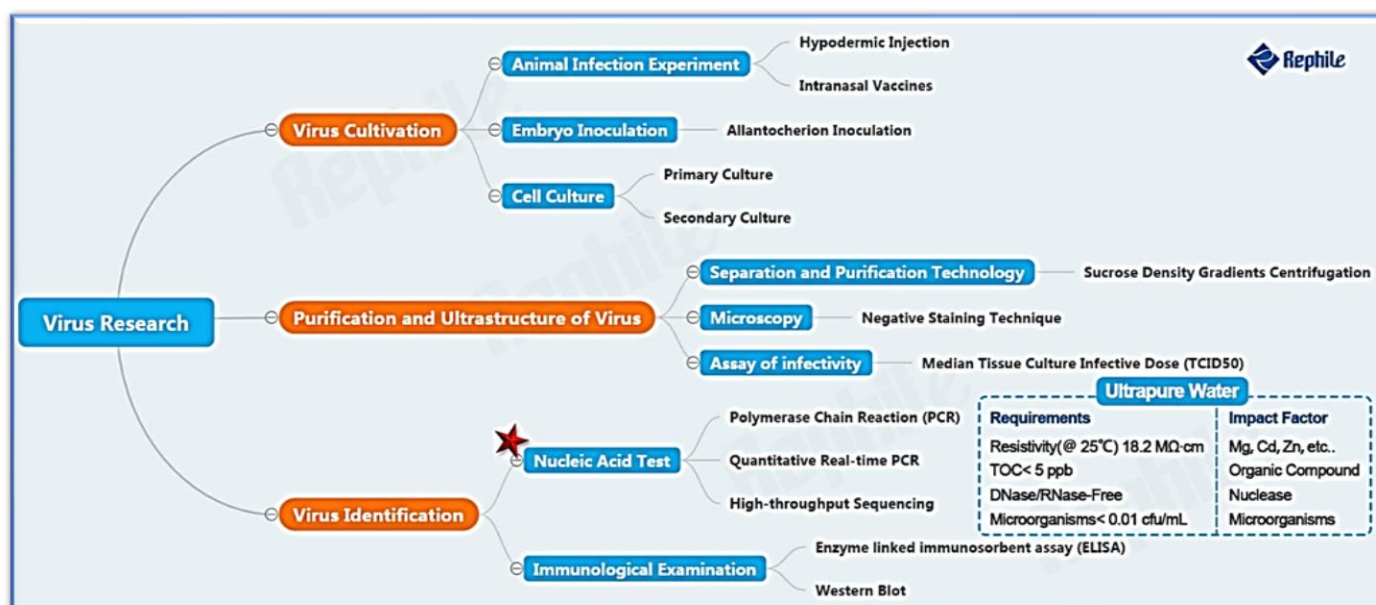


## Essential water quality for COVID-19 testing

COVID-19 or novel coronavirus is wildly spreading across the world and its outbreak has set alarm bells ringing globally. Effective diagnostic methods are crucial to the early diagnosis, prevention and control of the pandemic, such as nucleic acid detection and antigen-antibody detection.

At present, nucleic acid test plays a critical role in the diagnosis of an active COVID-19 infection, especially PCR (polymerase chain reaction) tests because of its efficiency and specificity. PCR is now part of the recommended protocol by World Health Organization (WHO) to detect COVID-19 virus early.



PCR is a molecular technique to identify small trace of specific pieces of viral DNA or RNA in samples by amplifying such specific pieces of molecules to large quantities to be detected. PCR tests require strict experimental operations as well as reaction conditions, from sample collection, nucleic acids extraction to amplification. As a basic reagent, water serves as a key component and inseparable from PCR reaction mixture, therefore its quality is proven to have vital implications for final test results.

To eliminate interferences, nuclease and bacteria free water is required for PCR reactions. However, other impurities existing in water can also significantly influence the accuracy of the results.

## **Particles**

It may interfere with fluorescence signals and cause erroneous readings.

## **Ions**

Commonly heavy metal divalent cations, such as  $\text{Cu}^{2+}$ ,  $\text{Fe}^{2+}$ , etc. may bind to active site of enzymes thus inhibit their catalytic activity.

In PCR reactions, TaqDNA polymerase is the most crucial catalyst and is very sensitive to the concentration of magnesium cation ( $\text{Mg}^{2+}$ ). A very specific  $\text{Mg}^{2+}$  concentration is required for PCR optimization. If not controlled,  $\text{Mg}^{2+}$  containing contaminants in the water background will reduce the accuracy of tests, resulting in false positive results.

## **Organics**

Some organic compounds can either inhibit polymerase or bind to fluorescent substances in PCR, reducing the accuracy of experimental which leads to false negative results.

## **Nucleases**

The presence of nucleases contaminants in water will reduce the concentration of the template, leading to high CT values and even false negative results.

## **Microorganisms**

Microorganisms contaminants from water can cause non-specific amplification, bringing inaccurate results or even false positive. Meanwhile, a lot of bacteria can release nucleases, organic materials as well as ions that can impede DNA polymerization.

In summary, the best practice to get good results in PCR tests is to use ultrapure water during the whole procedures. The following parameters are equally important for such tests:

- Resistivity 18.2 MΩ.cm at 25°C
- TOC < 5 ppb
- Nuclease and bacteria free
- Microorganisms < 0.01 CFU/mL

A reliable source for ultrapure water can help saving time and money for COVID-19 testing in the long run. RephiLe's Genie range ultrapure water systems are ideally suited for different needs of diagnostic testing labs.



Genie G Ultrapure & EDI Lab Water Systems

produces ultrapure water and EDI water from tap water directly.



Genie PURIST Ultrapure Lab Water Systems

produces ultrapure water from RO, distilled or deionized water



Genie A Ultrapure & RO Lab Water Systems

produces ultrapure water and RO water from tap water. No storage tank needed

Genie laboratory water purification systems are powerful and revolutionary, bringing the maximum user convenience and assurance from the latest technologies to your lab.

Special benefits of Genie systems to PCR based tests:

- a) A unique low-magnesium purification cartridge, which specifically targets magnesium ions in water to ensure minimum interference with PCR reactions.



- b) RephiBio final filter removes DNase and RNase as well as bacteria, avoiding interferences to PCR reactions



Other Highlights of Genie water systems

- Advanced wireless communication technologies and more freedom with placement
- Full traceability and comprehensive monitoring of consumables and accessories
- Waterproof control screen, operable with gloves and wet hands
- Compact and small footprint. Smart space utilization.