

# Type II pure water minimizes interference in UV-VIS spectrophotometry

## Abstract

The importance of the quality of the water used to prepare samples, standards and reagents for ultraviolet and visible spectrophotometric techniques should not be underestimated. Pure water of at least Type II quality is necessary to ensure the elimination of compounds which may interfere with the absorbance measurement of the compound or element under investigation.

## Introduction

Ultraviolet-visible (UV-VIS) spectrophotometry is the determination of the structure or quantity of a substance by measuring its capacity to absorb light at one or more wavelengths in the ultraviolet and visible spectrum. It is a long established and widely used analytical technique for the quantification of complex-forming transition metals highly conjugated organic compounds and biological macromolecules. Although difficult to use for the identification of unknowns, it can provide structural data and may be used to confirm the absence of certain impurities. Its areas of application<sup>1-5</sup> include life sciences, chemistry, pharmaceuticals, foods, pigments and polymers, for research and quality control purposes. In addition, UV-VIS spectrophotometers are frequently used as detectors for high performance liquid chromatography (HPLC), as most organic compounds absorb light at short wavelengths.

Purified water<sup>6</sup> is an essential requirement for UV-VIS spectrophotometry to avoid interference. Water quality of at least Type II is recommended, as impurities such as particulates, bacteria, and particularly ions and trace organics, can adversely affect results.

### Organic compounds

Low total organic carbon (TOC) is particularly important for UV detection, as highly conjugated organic molecules are UV absorbing. Organic compounds can also complex with metal ions.

### Ions

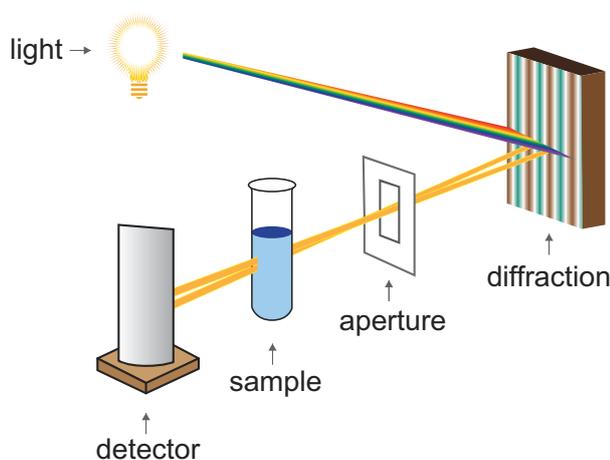
The ions of interest must be absent, as well as other ions, such as nitrates and some metals, which absorb in the UV-VIS region or could complex with the reagents.

### Particulates and colloids

Particulates and colloids in solution or adhering to optical windows or cells can scatter light, causing inaccurate measurements.

### Bacteria

Bacteria can release ions and produce organic by-products, and may also act as particulates, interfering with absorption measurements as described above.



**Diagram 1:** Schematic diagram of a UV-VIS spectrophotometer

## Purifying water for UV-VIS spectrophotometry

Spectrophotometric detection requires the use of pure water for the preparation of all reagents, buffers, mobile phases and any sample pre-treatments<sup>7</sup>, and should also be used to rinse cuvettes. Typically, water used for UV-VIS analysis should have a resistivity > 1 MΩ.cm, TOC of less than 50 ppb and have been microfiltered. Type II pure water from ELGA's PURELAB® Option-R or PURELAB Pulse, with a resistivity > 15 MΩ.cm, a low TOC content of < 20 ppb and bacteria levels of less than 1 CFU/ml, is recommended.

### Reverse Osmosis

Reverse osmosis membranes remove water contaminants that are greater than 1 nm in diameter. Typically they remove in excess of 95 % of ionic impurities, most organic compounds and virtually all particulate contamination.

### Ultraviolet (UV) radiation

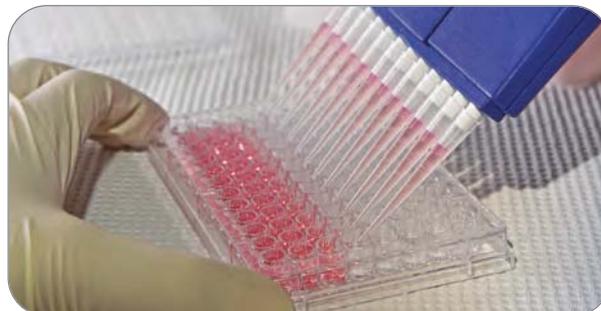
Light from a low pressure mercury lamp disrupts the activity of bacterial enzymes, preventing replication of bacteria.

### Media

The use of high purity resins in the Pulse module (Electrodeionization) and in the PURELAB Option-R purification cartridge ensure effective removal of residual ions.

### Filtration

Point-of-use filtration removes any particles, macromolecules or bacteria which may be present after purification. ELGA's PURELAB Pulse and Option-R systems use point-of-use filters which effectively minimize particle release and contamination.



## Conclusion

Type II pure water for UV-VIS spectrophotometry should have a resistivity > 1 MΩ.cm and be free from bacteria, particulates, organic and ionic compounds to ensure accurate absorbance measurements are obtained.

To find out more about ELGA LabWater's water treatment technologies and solutions for analytical applications, visit [www.elgalabwater.com](http://www.elgalabwater.com)

### References

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## About ELGA LabWater

ELGA manufactures supplies and services water purification systems for use in laboratories, healthcare and clinical environments and has been a trusted brand for over 75 years. Water qualities meet the requirement specifications for general laboratory, healthcare and clinical grades of water. ELGA offices and distributors are located in more than 60 countries worldwide. ELGA is the global laboratory water brand name of Veolia.

Veolia is the global leader in optimized resource management. With over 200,000 employees\* worldwide, the company designs and provides water, waste and energy management solutions that contribute to the sustainable development of communities and industries. Through its three complementary business activities, Veolia helps to develop access to resources, preserve available resources, and to replenish them. Veolia Water Technologies specializes in technological solutions and design and build projects for water and wastewater treatment, serving industrial and municipal clients.

In 2013, Veolia supplied 94 million people with drinking water and 62 million people with wastewater service, produced 86 million megawatt hours of energy and converted 38 million metric tons of waste into new materials and energy. Veolia (Paris Euronext: VIE and NYSE: VE) recorded revenue of €22.3 billion\* in 2013.

**For more information please visit**

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