

Optimal Solvent and Cell Selection for the Near-Infrared Region

Kazumi Kawahara and Kazuki Sobue

User Benefits

- ◆ Indicates the wavelength ranges available within the near-infrared region of various solvents.
- ◆ Describes cell selection in the near-infrared region.

Introduction

Near-infrared light is widely used for a wide variety of applications because it penetrates various substances and has little effect on the human body. Recently, it has been used for light detection and ranging (LiDAR) applications, which are used in autonomous vehicle driving and cancer photoimmunotherapy.

When solutions are measured by spectrophotometry, organic solvents, in particular, have absorption in the near-infrared region, so it is necessary to select a solvent that does not affect the target wavelengths.

This article describes confirming the near-infrared wavelength range available for each solvent.

Solvent Selection in the Near-Infrared Region

When selecting a solvent for solution measurement, the solvent should dissolve the sample, not interact with sample components, and have little absorption in the measurement wavelength range. Water has no absorption in the UV-Visible region and is an excellent solvent. However, it has a very large and broad absorption peak in the near-infrared region, which limits the wavelength ranges where it can be used. In contrast, organic solvents have absorption in different wavelength ranges depending on the solvent, so it is necessary to determine the available wavelength range. To focus on the near-infrared region in this case, the transmittance of various solvents was measured using a quartz cell designed for near-infrared light with an optical path length of 1 mm and the conditions shown in Table 1. The measurement results are shown in Fig. 1 to 7, and an example of the wavelength range available for each solvent is shown in Table 2.

Table 1 Measurement Conditions

Instrument:	UV-3600i Plus
Measurement Wavelength Range:	700 to 3000 nm
Sampling Pitch:	1.0 nm
Scan Speed:	Medium
Slit Width:	5 nm
Detector Switching Wavelength:	700 nm/1650 nm
Grating Switching Wavelength:	700 nm
Step Correction:	ON

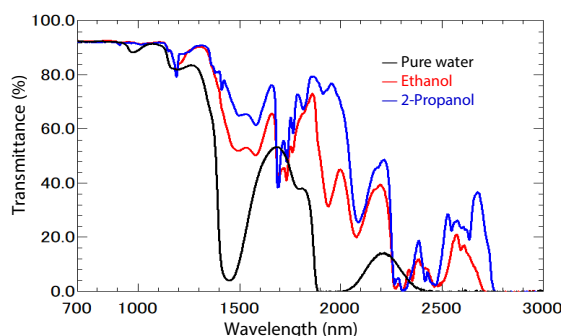


Fig. 1 Transmission Spectra of Each Solvent (Using Cell with 1 mm Optical Path Length)

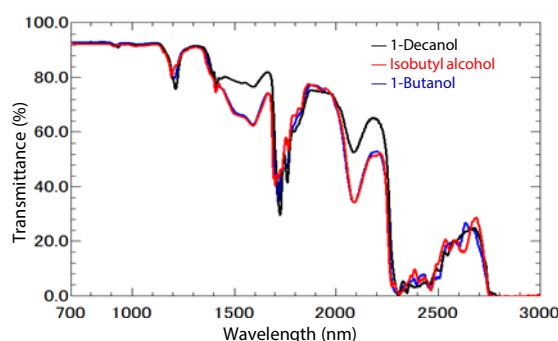


Fig. 2 Transmission Spectra of Each Solvent (Using Cell with 1 mm Optical Path Length)

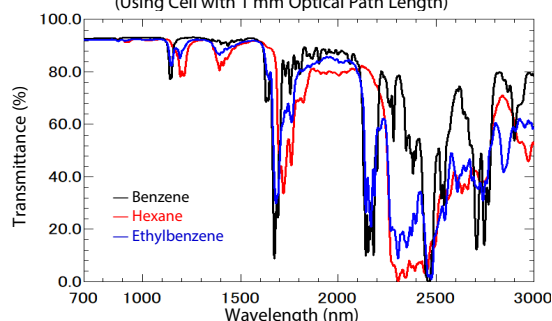


Fig. 3 Transmission Spectra of Each Solvent (Using Cell with 1 mm Optical Path Length)

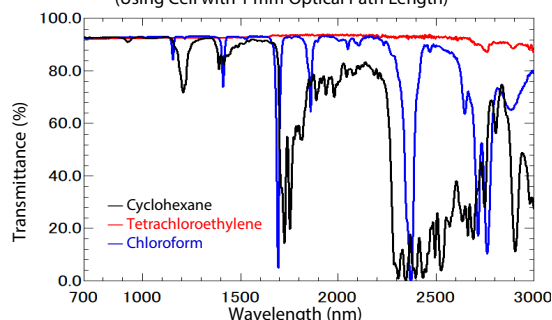


Fig. 4 Transmission Spectra of Each Solvent (Using Cell with 1 mm Optical Path Length)

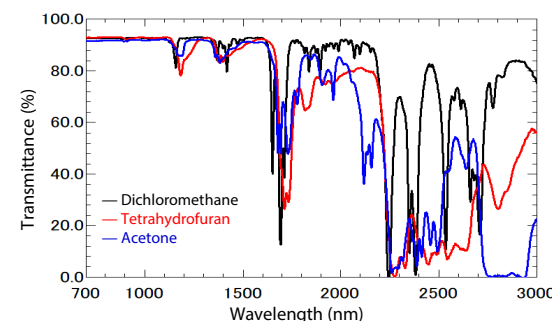


Fig. 5 Transmission Spectra of Each Solvent (Using Cell with 1 mm Optical Path Length)

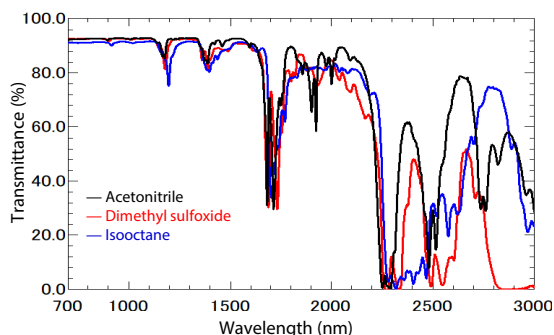


Fig. 6 Transmission Spectra of Each Solvent (Using Cell with 1 mm Optical Path Length)

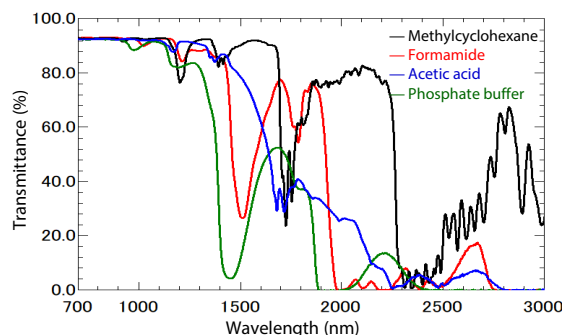
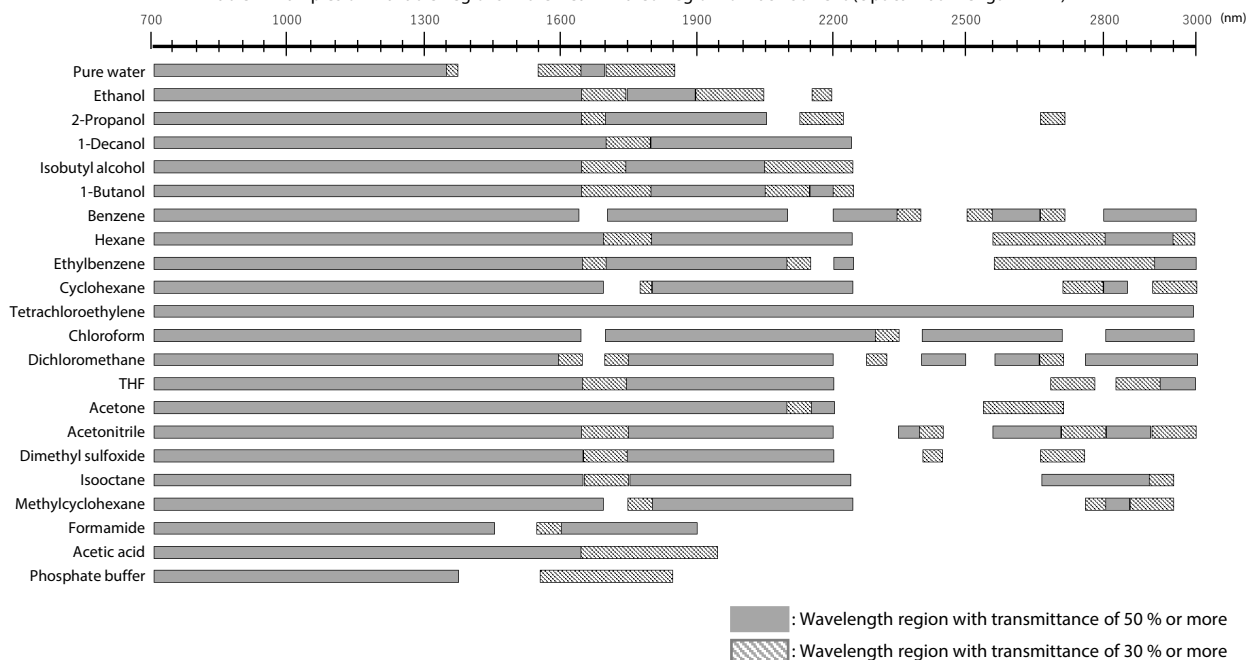


Fig. 7 Transmission Spectra of Each Solvent (Using Cell with 1 mm Optical Path Length)

Table 2 Examples of Available Regions in the Near-Infrared Region for Each Solvent (Optical Path Length 1 mm)



Cell Selection in the Near-Infrared Region

Fig. 8 shows the results of transmittance measurements in the near-infrared region using three types of cells (optical path length 1 mm) made of different materials.

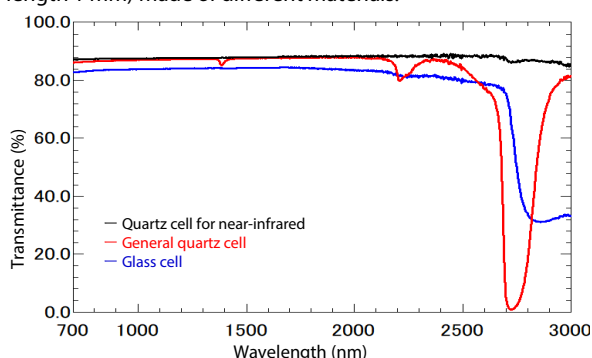


Fig. 8 Transmittance Spectra Measured with Cells made of Different Materials (1 mm Optical Path Length)

The available wavelength ranges are different depending on the cell in the same way as the solvent described above. Be careful when selecting the cell.

Conclusion

We measured the transmittance of various solvents and cells of different materials in the near-infrared region. When measuring samples, it may be difficult to obtain good data in a wavelength range where the solvent or cell absorbs light. Therefore, an appropriate solvent and cell need to be selected.

› Please fill out the survey

Related Products

Some products may be updated to newer models.



› UV-3600i Plus
UV-VIS-NIR Spectrophotometer

Related Solutions

› Autonomous Driving

› Price Inquiry

› Product Inquiry

› Technical Service /
Support Inquiry

› Other Inquiry