

### Spectral Transferability between Axsun Analyzers

The ability to directly transfer models developed on one analyzer to additional analyzers without calculating model or spectral mapping functions is essential for wide-scale implementation of NIR analyzers.

The spectral response from instruments must be nearly identical in wavelength accuracy, photometric linearity and band shape to insure successful model or data transfer.

An industry standard test for evaluating similarity of instruments is often referred to as “the toluene test”. Toluene, or another easy to get high purity single component chemical is scanned on multiple analyzers, and the spectra are compared by spectral subtraction.

Figure 1 shows spectra of toluene scanned on six different Axsun analyzers. The sample was scanned in a transmission cell with a pathlength of 0.95 mm at room temperature. An 8-micron single mode polarization maintaining fiber was used to transmit the source energy to a collimator assembly. The transmission cell is mounted in the collimator assembly, and a 600-micron multimode fiber optic cable was used to return the light to the detector. The samples were scanned between 1350 and 1800 nm in 0.12 nm steps at a spectral resolution of 1 nm. Ten scans were averaged for each spectrum in one second. The six spectra overlap very closely as seen in figure 1, indicating a good match between instruments.

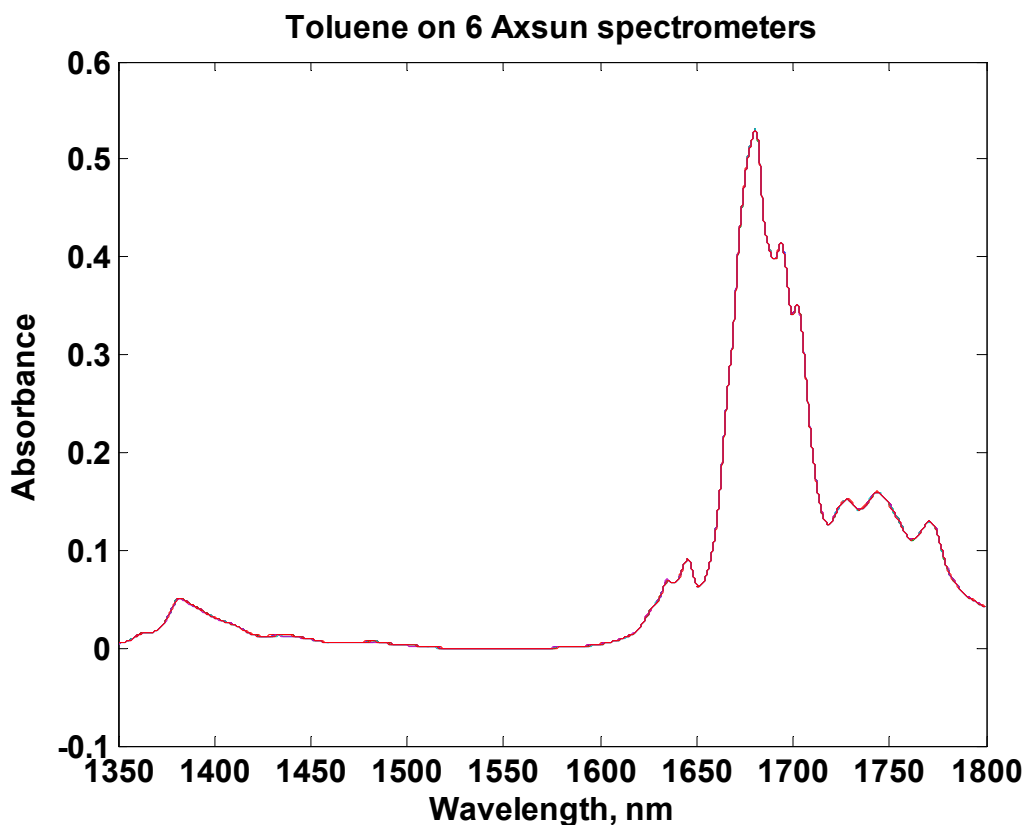
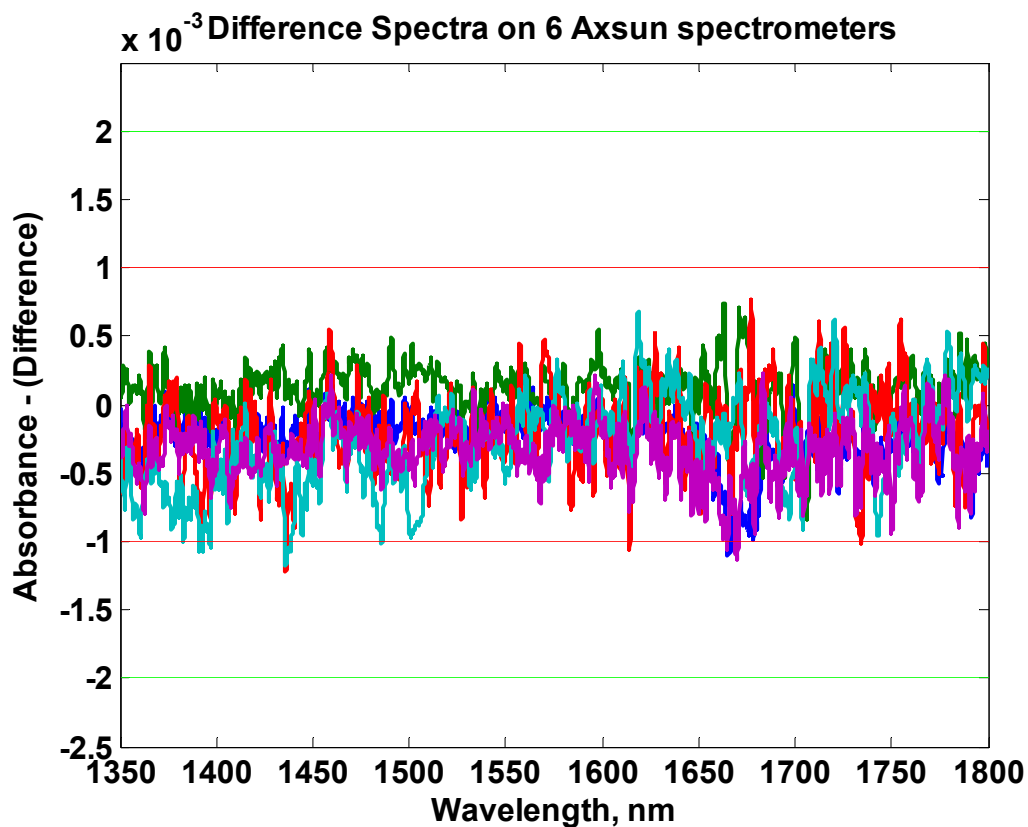


Figure 1: Toluene spectra collected on 6 Axsun spectrometers

The six toluene spectra had a single point baseline correction applied. The spectra of toluene collected on one analyzer was subtracted from the remaining 5 analyzers. The difference spectra are shown in figure2. The general specification for instrument matching is +/- 2 milliabsorbance units (plotted as horizontal green lines). The difference spectra shown are within +/- 1 milliabsorbance (plotted as horizontal red lines) units indicating excellent matching in both the wavelength and absorbance axes.



**Figure 2: Difference spectra for toluene**

**Conclusion:**

Excellent instrument matching has been demonstrated for six Axsun NIR spectrometers. This high degree of matching enables model and data transfer between spectrometers.