

The simple measurement method of liquid sample in near-IR region

<Introduction>

Since near-IR light is transmissive to glass, it is widely used as the quantitative and qualitative analysis method to measure powder sample in test tube or sample bottle. On the other hand, generally the liquid sample is measured in transmittance method using thin cell with 1-3 mm cell length.

The commercial cell is too expensive to use as disposable, and it is difficult to clean the cell due to its thin cell length.

In the measurement method by using hematocrit capillary cell, there were some problems that the cell cap cannot be used for strong smell sample such as fragrance, or high viscosity sample cannot be inserted to the cell. In this note, we would like to introduce the simple measurement method by using the test tube with cell cap or easy washable laboratory dish.

<Instrument>

Portable type near-IR detected instrument VIR-9650.

Since VIR-series are compact and transportable, and installed easily, they can be widely used depending on the purpose such as manufacture line, outside or acceptance test. In this note, VIR-NRF-N is used as optional accessory and test tube holder and laboratory dish are measured (Photos 1, 2 and 3).

<Measurement example 1; mini test tube>

Photo 2 shows measuring the solution in mini test tube mounted on test tube holder. By setting the flat surface cylindrical stainless spacer in the test tube, cell length can be controlled as solution cell. The light is irradiated from the bottom of the tube, transmit the solution, reflect on the surface of spacer, and then pass back to the bottom. Since the cell length (thickness) can be controlled to optimum length for near-IR, the good spectrum as the same as current transmittance angular cell can be obtained.



Photo 1: transportable near-IR measurement system

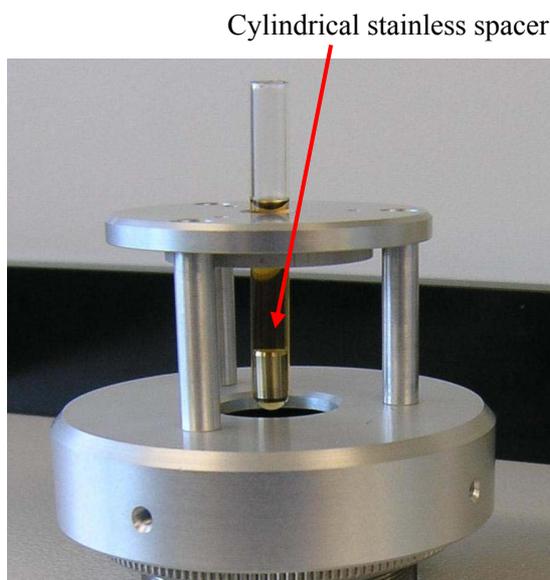


Photo 2: measurement example of solution using mini test tube

Figure 1 and 2 show the solution spectrum obtained by this method, and good repeatability. Figure 3 show the reference data of the spectrum obtained by using hematocrit capillary cell. It can be confirmed that the saturated absorbance peak in the measurement method using hematocrit capillary cell is obtained without saturating in the test tube method.

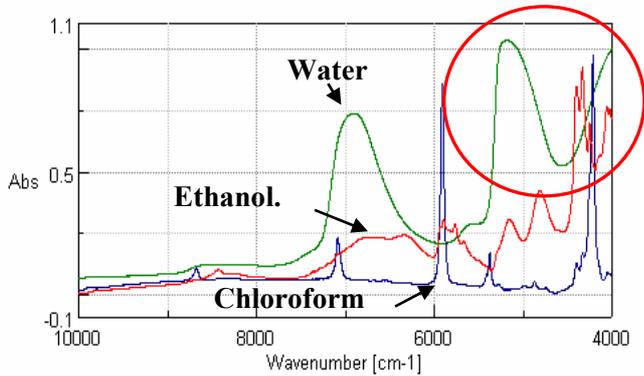


Figure 1, Measurement example using test tube

<Measurement example 2: Laboratory dish >

When the sample has strong flavor and the Amount is enough, it is more suitable to use the easy washable wide mouth case such as Laboratory dish. Photo 3 shows the mounted laboratory dish. Since the incident light is directly reflected on the surface of the flat bottom case such as laboratory dish, sample absorbance spectrum might not be measured.

In order to avoid this phenomenon, by tipping the reflectance face on the angle to light axis, the better absorbance spectrum can be obtained.

The cell thickness can be controlled by using metal reflectance plate with spacer on the laboratory dish. Figure 4 shows the measurement example of solution sample using laboratory dish. The optimum size of the spacer used with metal reflectance plate is approx. 400 μm. But the thickness of the spacer depends on the sample

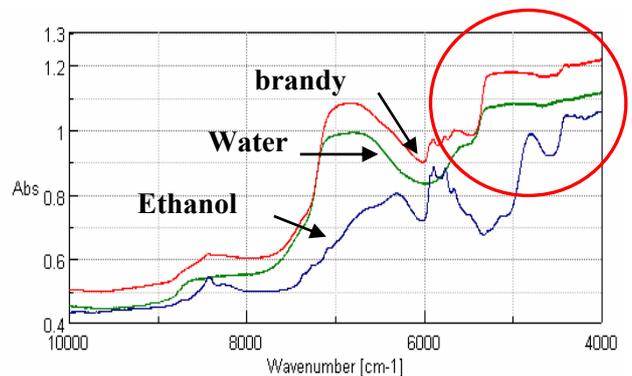
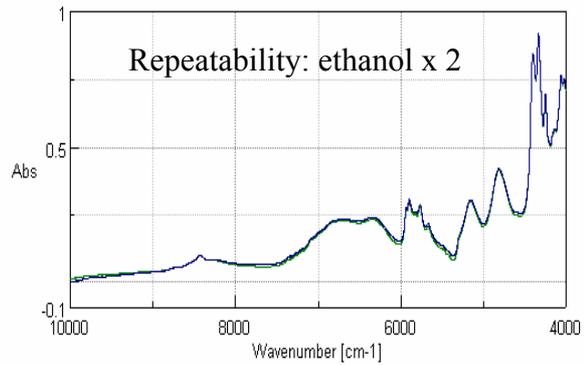


Figure 2, Reproducibility using Ethanol

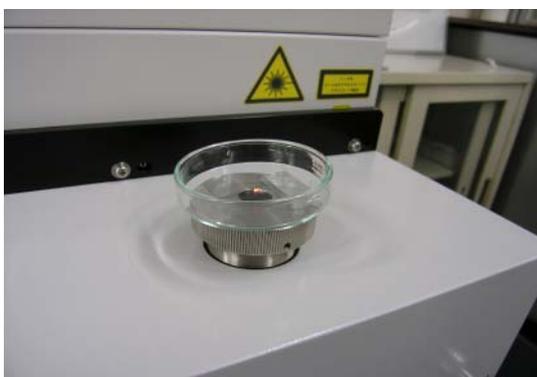


Photo 3: Measurement example of solution sample using laboratory dish

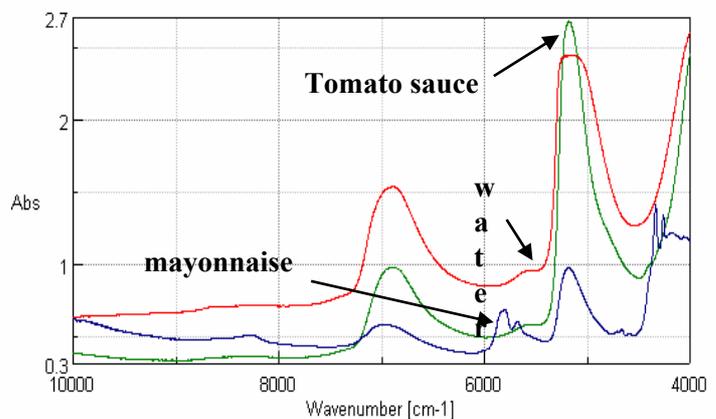


Figure 4. Measurement example using laboratory dish