

Q. How can we reduce the noise due to water vapor and carbon dioxide?

A. “Data processing” and “nitrogen purge and evacuation inside an instrument” are well known methods to reduce the noise due to water vapor and carbon dioxide. We would like to introduce the methods of noise reduction by “Sample shuttle”, and the combination of “Purge and Vacuum” and “Interval measurement program”.

Since water vapor (vapor) and carbon dioxide (CO₂) in the atmosphere have absorption in the infrared region, they happen to interrupt the analysis and detection of weak peak. The reduction method of these noise is as explained above but the most important point is to keep the concentration of vapor and CO₂ at the same level when measuring a background and sample, not just conducting a measurement without an attention to the point. Here, we would like to introduce a couple measurement tips of “Shuttle measurement” and “Purge and evacuation”.

-Measurement method

1. Shuttle measurement

Shuttle measurement is an effective method for transmission measurement. Since sample is set in the sample compartment in advance to enable background and sample measurement without opening a compartment door but with shuttle switching, a measurement can be conducted without an effect of any change in the atmosphere. Moreover, it is possible to obtain better spectra with less noise from vapor and CO₂ by conducting background and sample measurements repeatedly one after another in short time.

2. Purge and evacuation + Interval Measurement Program

This is a useful method when attachments such as ATR measurement are additionally required as well as transmission measurement. Purge and evacuation remove vapor and CO₂ in an instrument to prevent noise generated by them.

When applying this method, the level of purge and evacuation have to be maintained equivalent between background measurement and sample measurement. Supporting the process, it is effective to use Interval Measurement Program in collaboration with the method as it provides continuous measurement of the process for purge and evacuation condition changes. With the function, the data with purge and evacuation level kept equivalent can be obtained to enable much easier acquisition of spectra with no effect of vapor and CO₂.

-Measurement example

Measurement examples obtained with the method 1 and 2 above are introduced below.

The method 1 was applied for measuring a thin film of calcium stearate on the surface of CaF₂ board. Figure 1 shows the measurement result of both cases, Shuttle measurement was applied and not. When measuring a weak peak such as of a thin film, vapor and CO₂, which won't be an issue on a strong peak measurement, affects acquiring spectrum in great deal. In Shuttle measurement, it can be observed that the effect of water vapor and carbon dioxide was effectively decreased.

The method 2 was applied for measuring vinyl chloride film using Full vacuum system and ATR. The result of interval measurement is indicated in Figure 2. It can be observed that the data whose evacuation level was not maintained shows effect from vapor and CO₂. In this case, measurement usually has to be performed again, releasing vacuum state. In interval measurement, it is easy to obtain the spectra without vapor and CO₂ as data is kept obtained in continuous manner.

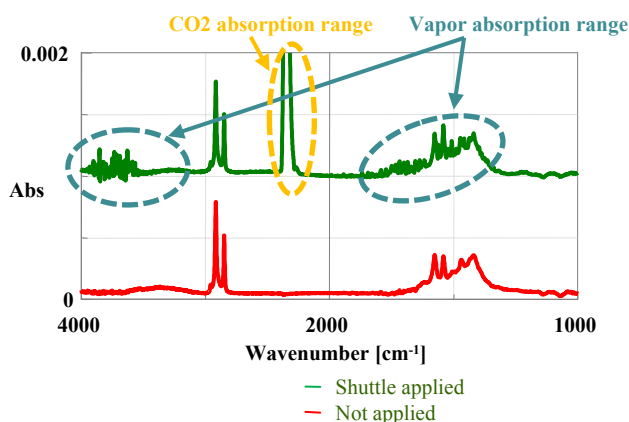


Fig.1 Shuttle measurement result

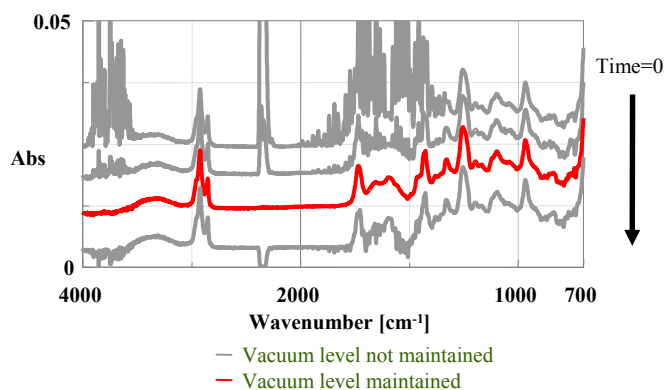


Fig. 2 Full vacuum + Interval measurement result