

## Evaluation of Drainage by Near Infrared Spectroscopy

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Water pollutants in drainage mainly consist of organic compounds. Hence, total organic carbon (TOC), chemical oxygen demand (COD), and biochemical oxygen demand (BOD) were generally used as the indices of pollution. However, these values are determined by special analyzer (TOC), titration method (COD), or microbe culture (BOD). Therefore, the development of simple and easy methods for the determination of water pollution is required. The authors reported the evaluation of water pollution by near infrared (NIR) spectroscopy in a model system with food components (Takamura et al. (200) Near Infrared Spectroscopy: Proceedings of 9th International Conference, pp. 503-507). In this study, the relationship between NIR spectra and drainage was investigated in order to develop a method for evaluation of drainage by NIR.

Drainage was obtained in Nara Purification Center. The ranges of TOC, COD, and BOD were 0-130, 0-100 and 0-200, respectively. NIR transmittance spectra were recorded on NIRSystems Model 6250 Research Composition Analyzer in the wavelength range of 680-1235 and 1100-2500 nm with a quartz cell (light path: 0.5, 1, 2, 4 and 10mm) at 10-40 °C. Statistical analysis was performed using NSAS program. A partial least squares (PLS) regression analysis was used for calibration.

As the result, a good correlation between the raw NIR spectra and OC was obtained in the calibration. The best light path was 10 and 0.5mm in the wavelength range of 680-1235 and 110-2500nm, respectively. In the calibration, correlation coefficients  $R^2$  were 0.96-0.97 in the both range. In the prediction, however, a good correlation ( $R=0.89-0.96$ ) was obtained only in the range of 680-1235 nm. Similar results were obtained in the cases of COD and BOD.

These results suggest the possibility that NIR spectroscopy can be used to evaluate drainage.