INTRODUCTION

Since November 2012, the Indoor Air Quality (IAQ) regulation has been implemented in Taiwan (Taiwan Indoor Air Quality Act, 2011) and it regulated indoor air factors including CO2, CO, temperature, relative humidity, total volatile organic compounds (tVOC), and so on. The tVOC is defined as the summation of 12 specific VOCs concentrations using NIEA A715.14B method according to Taiwan Environmental Protection Agency's (Taiwan EPA) guideline (NIEA A715.14B). The NIEA A715.14B method is highly accurate and reliable but may not be optimized for on-site setup with continuous tVOC monitor configuration due to its inherent complex and time-consuming process using canister-GC/MS analysis in laboratory. This work aims to evaluate a portable device that can provide a reliable alternative for on-site continuous tVOC monitor setup in compliance with Taiwan EPA regulation.

METHODOLOGIES

Continuous tVOC levels for one day at various indoor environments were measured using 2 portable devices, ppbRAE 3000 and MiTAP-IAQ® (by TRICORNTECH Corp.) as illustrated in Figures 1 and 2. The ppbRAE 3000 is based on photo-ionization technique, which measures total concentration of all VOCs ionized by the UV light. The MiTAP-IAQ® device utilizes miniaturized auto-sampler & pre-concentrator, micro-GC, and detector array to measure the 12 specific VOCs in Taiwan IAQ regulation. To assess the validity of the two methods, canister samplings were also collected at same sites and periods using both portable devices. The reference tVOC concentrations were then obtained by NIEA A715.14B method. Finally, the one-day tVOC concentrations and fluctuation trends measured by two portable devices were compared to the reference tVOC values.

RESULTS AND DISCUSSIONS
The continuous one-day monitor results measured by MiTAP-IAQ® showed similar tVOC concentration values and consistent fluctuation trend with those obtained by NIEA A715.14B as shown in Figures 3 and 4. MiTAP-IAQ®’s tVOC values were also highly correlated with those measured by NIEA A715.14B method with correlation coefficients ranged from 0.982 to 0.988. On the contrary, the concentrations of tVOC measured by ppbRAE 3000 were overestimated and less correlated with values assessed by NIEA A715.14B method.

CONCLUSIONS

The portable MiTAP-IAQ® demonstrated its good correlation with the standard method, NIEA A715.14B. It provides a reliable option to continuous on-site tVOC monitoring for Taiwan IAQ applications. Following are the preliminary data measured in clinic and office.

REFERENCES

Indoor Air Quality Act. (2011) by Environmental Protection Administration, Executive Yuan, R.O.C. (Taiwan).
Method NIEA A715.14B. (2011) by Environmental Analysis Laboratory, Environmental Protection Administration, Executive Yuan, R.O.C. (Taiwan).