移動實驗室設備系統與功能說明

1. 移動實驗室主要功能

（一）交通工具行進間空氣污染物排放濃度監測

（二）工業區污染事件空氣品質監測

（三）環境敏感區域短期監測作業

二、移動實驗室配置設備

（一）氣狀污染物

序號	監測物種	測定原理	測定範圍
1	二氧化硫（SO_2）	利用紫外光來激發二氧化硫分子後，量測其降回基態時所發出 350 nm 的螢光強度，以測定氣體中二氧化硫的濃度。	0-50 ppb or 0-20,000 ppb
2	氮氧化物（NO_X）	NO與O_3氣相反應會放出光，其強度與NO濃度成正比，利用此將含有NO_2與NO之NO_X氣體中之NO_2部分轉化成NO後，與O_3反應，偵測其所放出之光，即為NO_X濃度。若樣品氣體不經轉化作用，所得量測之值為NO濃度；二者之差即為二氧化氮的濃度。	0-50 ppb or 0-20,000 ppb
3	一氧化碳（CO）	利用 CO 吸收非分散性紅外線光源所放出紅外光之特性，測定樣品氣體中一氧化碳的濃度。	0-1 ppm or 0-1,000 ppm
4	二氧化碳（CO_2）	利用 CO_2 吸收非分散性紅外線光源所放出紅外光之特性，測定樣品氣體中 CO_2 。	0-2 ppm or 0-2000 ppm

5	臭氧（O_3）	利用 O_3 對紫外光的吸光特性，量測樣品氣體於 254 nm 的吸光強度，以計算得空氣中臭氧的濃度	0-100 ppb or 0-10 ppm
6	總非甲烷碳氫化合物(TNMH)	利用火焰化離子化偵測原理（FID），經過觸媒減化，測定待測空氣中總非甲烷碳氫化合物含量。	＜20 ppm
7	氨氣（NH_3）	藉由轉化器將 NH_3 轉化為 NO 後，再利用 NO 與 O_3 氣相反應會放出光，其強度與 NO 濃度成正比，偵測其所放出之光，扣除未經轉換時所測得 NO 濃度後即可得知 NH_3 濃度。	0-50 or 0-2,000 ppb

（二）氣膠碳

序號	監測物種	測定原理	測定範圍
1	元素碳/有機碳（EC/OC）	採樣完畢後，先於無氧狀態下，有機碳經過 MnO_2 氧化成 CO_2 後 NDIR 進行偵測可得有機碳(OC)濃度。在 2%O_2 元素環境下元素碳經過 MnO_2 氧化成 CO_2 後由 NDIRNDIR 進行偵測可得元素碳(EC)。	—

（三）粒狀污染物

序號	監測物種	測定原理	測定範圍
1	懸浮微粒(10 μm)/懸浮微粒(2.5 μm)	以貝他射線照射捕集 PM_{10}（或 $PM_{2.5}$）微粒之濾紙，量測採樣前後貝他射線通過濾紙之衰減量，再根據其微粒濃度與輻射強度衰減比率關係由儀器讀出空氣中 PM_{10}	$0 \sim 1 \times 10^4$ μg / m^3

	（PM_{10}/$PM_{2.5}$）	（或 $PM_{2.5}$）粒狀污染物的濃度。	

（四）空氣品質輔助氣象監測設備

1、風向.風速計

2、溫濕度感應器

（五）全球位置測定系統定位及資料連線系統

1、資料收集系統

2、GPS 行車紀錄系統

3、影像監視與錄影系統

Mobile Lab. Introduction

2. Key functions of the Mobile Lab.

（1）On-road measurement of the vehicle emission

（2）Real-time monitoring of the industrial area in pollution incident case

（3）Short-term monitoring for the environmental sensitive site

2. Allocated Instruments in the Mobile Lab.

（1）Gaseous pollutants

NO	Species	Monitoring principle	Working range
1	SO_2	SO_2 is electronically excited with the radiation of an UV lamp, yielding an excited species that fluoresces at 350 nm wavelength. Concentration of SO_2 is calculated based on the emission of fluorescence.	0-50 ppb or 0-20,000 ppb
2	NO_X	As NO reacts with O_3 electronically-excited NO_2* molecules will be generated. The light emission intensity is linearly proportional to the concentration of NO. Concentration of NO_X mixture can be measured if NO_2 is converted to NO before its reaction with O_3. The difference between NOx and NO results will be the concentration of NO_2.	0-50 ppb or 0-20,000 ppb
3	CO	Carbon Monoxide (CO) has a characteristic infrared absorption. The	0-1 ppm or 0-1,000 ppm

		absorption of infrared radiation by CO molecules can be used to measure CO concentrations using the non-dispersive infrared (NDIR) detector system.	
4	CO_2	Carbon Dioxide (CO_2) has a characteristic infrared absorption. The absorption of infrared radiation by CO_2 molecules can be used to measure CO_2 concentrations using the non-dispersive infrared (NDIR) detector system.	0-2 ppm or 0-2000 ppm
5	O_3	Ozone's has a characteristic absorption of UV at 254nm which can be used to measure the concentration of Ozone(O_3) in the sample gas.	0-100 ppb or 0-10 ppm
6	TNMH	Flame Ionization Detector (FID) with catalytic subtraction is used to measure the concentration of total non-methane hydrocarbons.	＜20 ppm
7	NH_3	As NO reacts with O_3 electronically-excited NO_2* molecules will be generated. The light emission intensity is linearly proportional to the concentration of NO. Concentration of NO_X mixture can be measured if NH_3 is converted to NO before its reaction with O_3. The difference between NOx and NO results will be the concentration of NH_3.	0-50 or 0-2,000 ppb

（2）Aerosol carbons

NO	Species	Monitoring principle	Working range
1	EC/OC	The Organic carbon in the collected samples is oxidized to CO_2 with manganese dioxide under anaerobic state detect with Flame Ionization Detector (FID) to obtain the concentration of organic carbon（OC）. On the other hand, the elemental carbon will be converted to CO_2 under the atmosphere of 2% O_2 in manganese dioxide oxidizing oven and detect with measured by the Flame Ionization Detector (FID) to obtain the concentration of elemental carbon（EC）.	—

（3）Particle pollutants

NO	Species	Monitoring principle	Working range
1	$PM_{10}/PM_{2.5}$	Comparing the β-ray attenuation of the filter before and after PM_{10}(or $PM_{2.5}$) sampling .calculate PM_{10}(or $PM_{2.5}$) concentration base on the reading of β-ray attenuation	$0 \sim 1 \times 10^4$ $\mu g / m^3$

（4） Auxiliary Meteorological instruments

1、Weather vane and anemometer

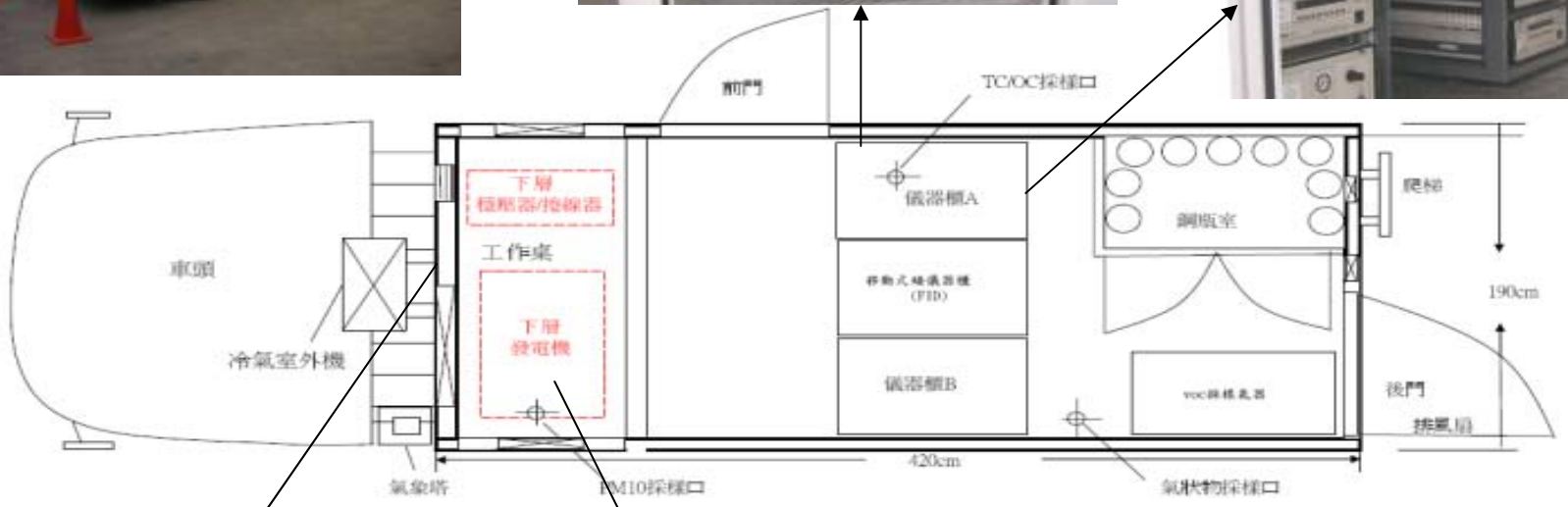
2、Hygrothermograph

（5）GPS and on-line data collection system

1、Data collection system

2、Global Positioning System, GPS

3、Monitoring system and video recorder


前門
TC/OC採樣口
下層
檢測器/控線器
工作桌
儀器櫃A
調壓室
爬梯
車頭
下層
發電機
儀器櫃B
190cm
後門
排氣扇
冷氣室外機
420cm
氣象塔
PM10採樣口