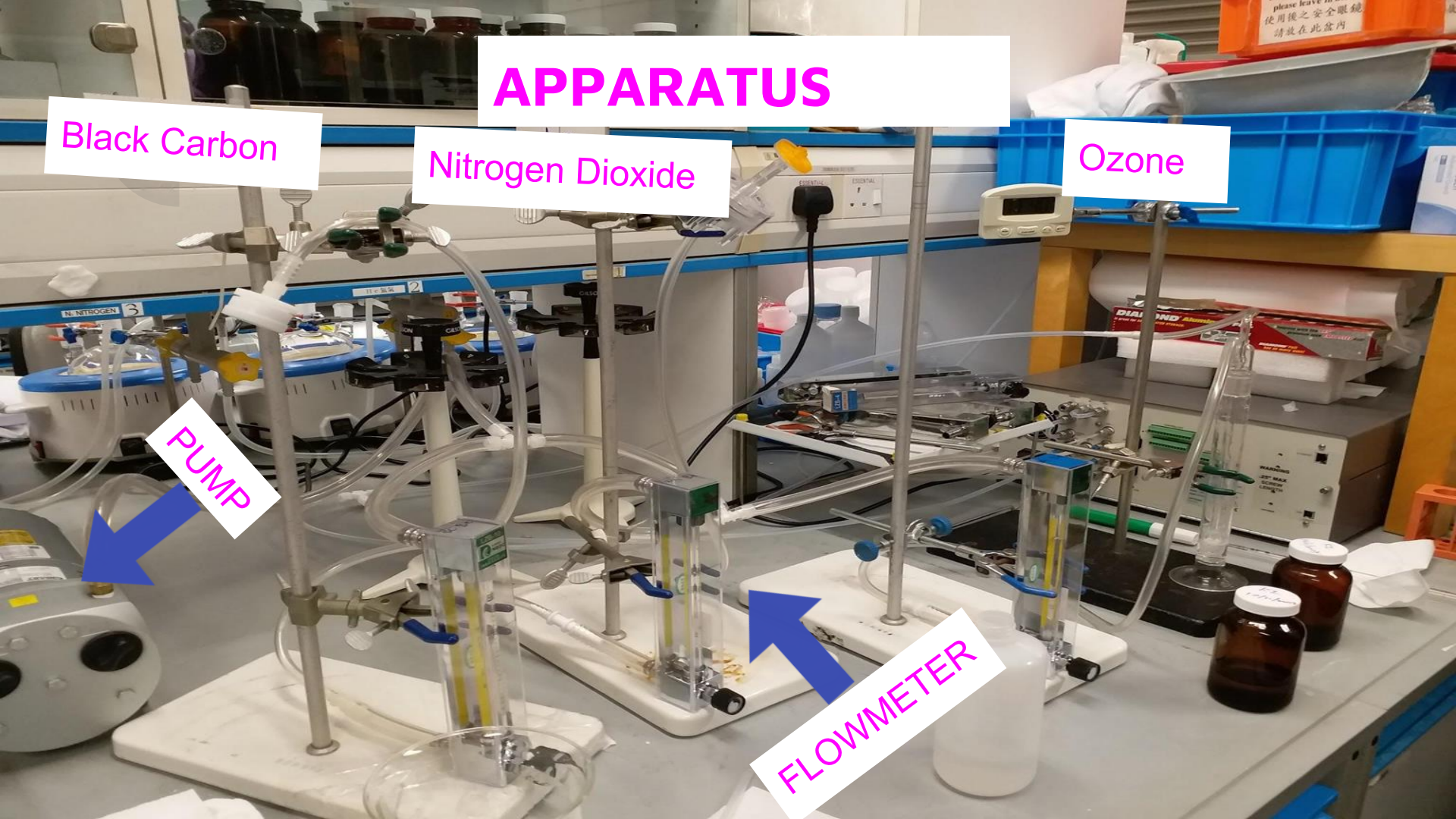
Valtorta College
Air Pollution Project

"Community EXPLORE: From Science to Action“ ---Supervised by HKUST

"Community EXPLORE: From Science to Action"

Aim of Project "Community EXPLORE: From Science to Action"

Compare the air quality around Valtorta College and Tai Po Monitoring Station at Ting Kok Road


APPARATUS
Black Carbon
Nitrogen Dioxide
Ozone
PUMP
FLOWMETER

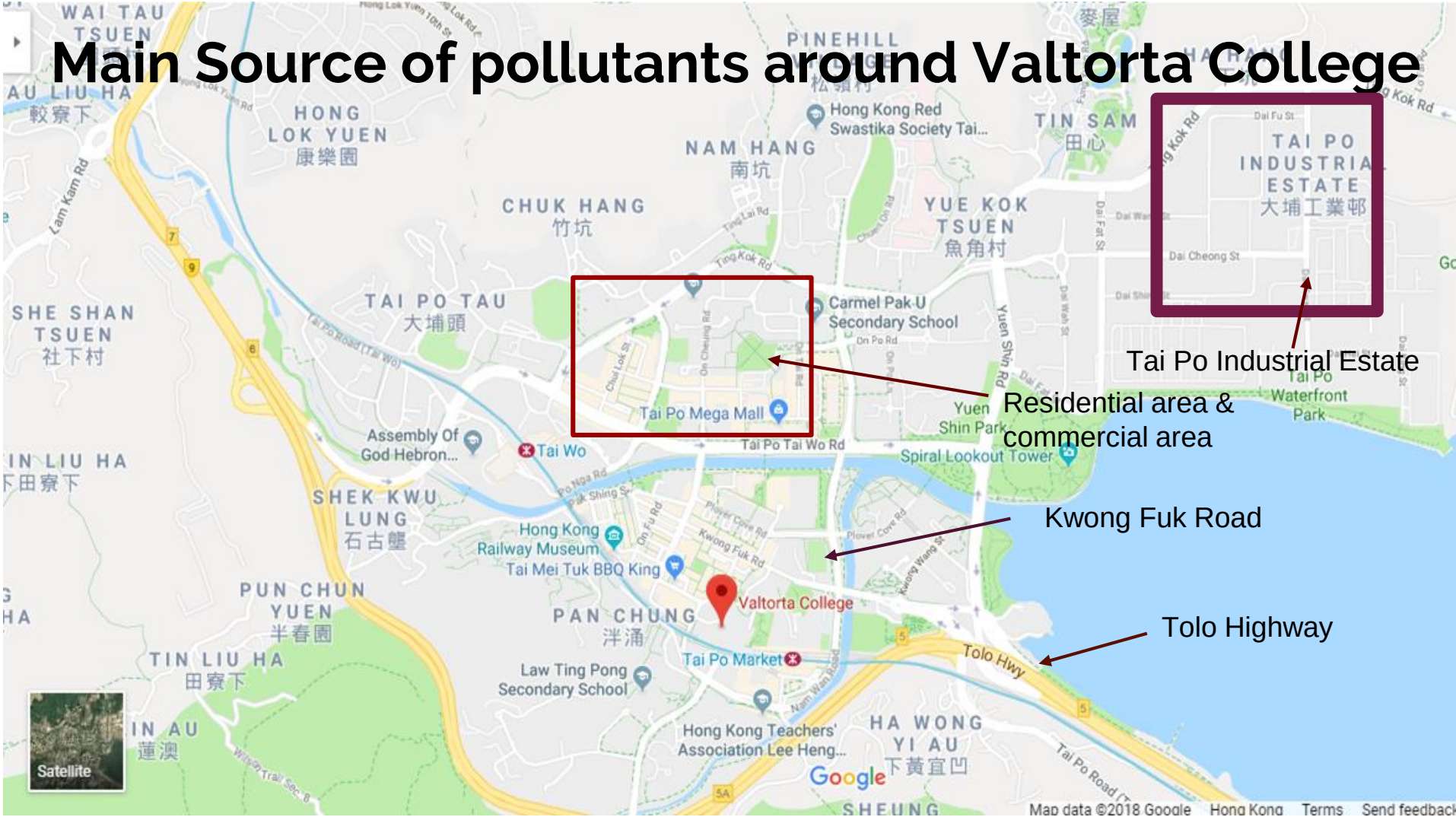
APPARATUS USED

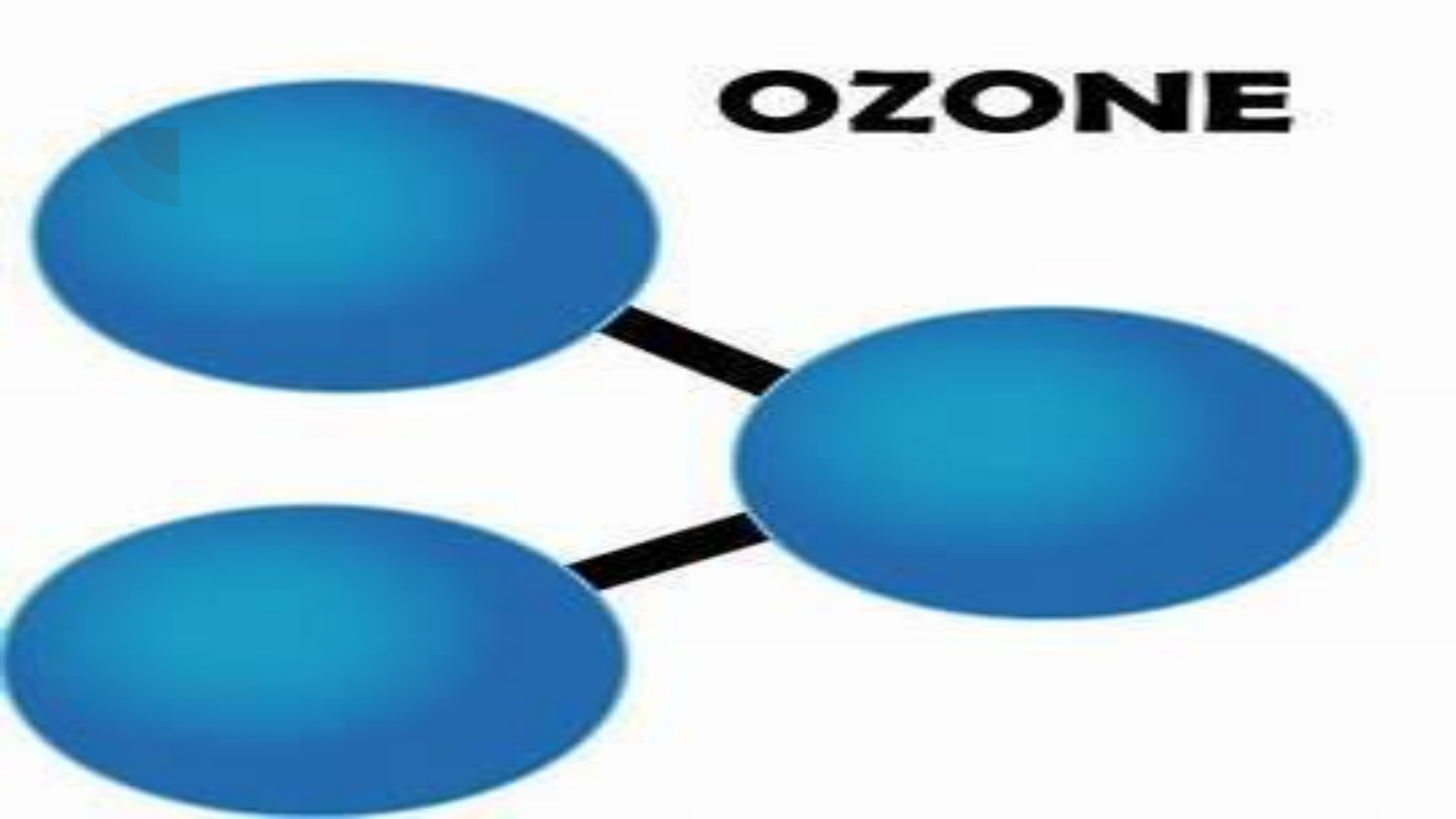
PIPETTE

HKUST PHOTOMETER

COLOR COMPARISON TUBE

Main Source of pollutants around Valtorta College

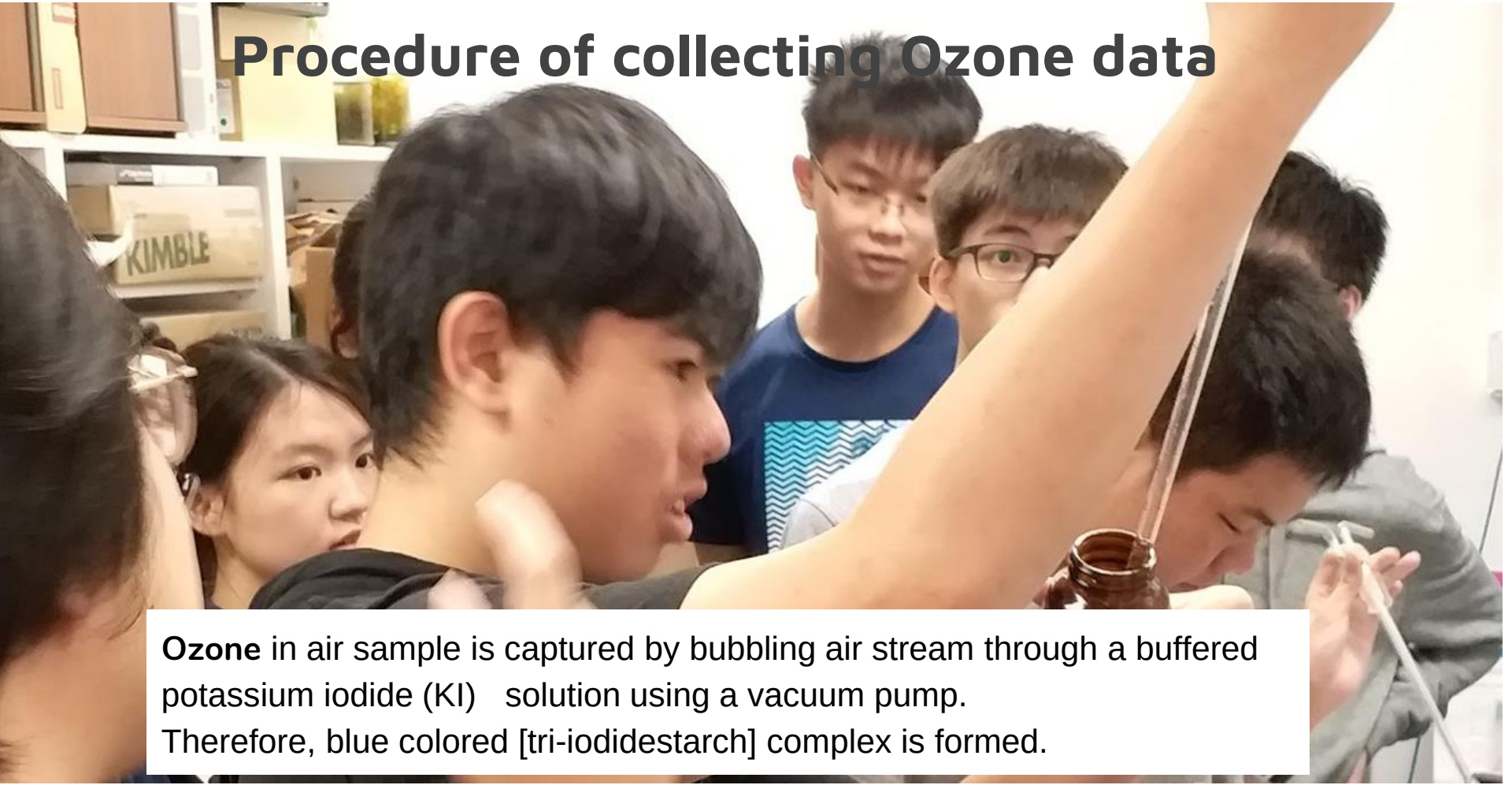



OZONE

Ozone(O_3)

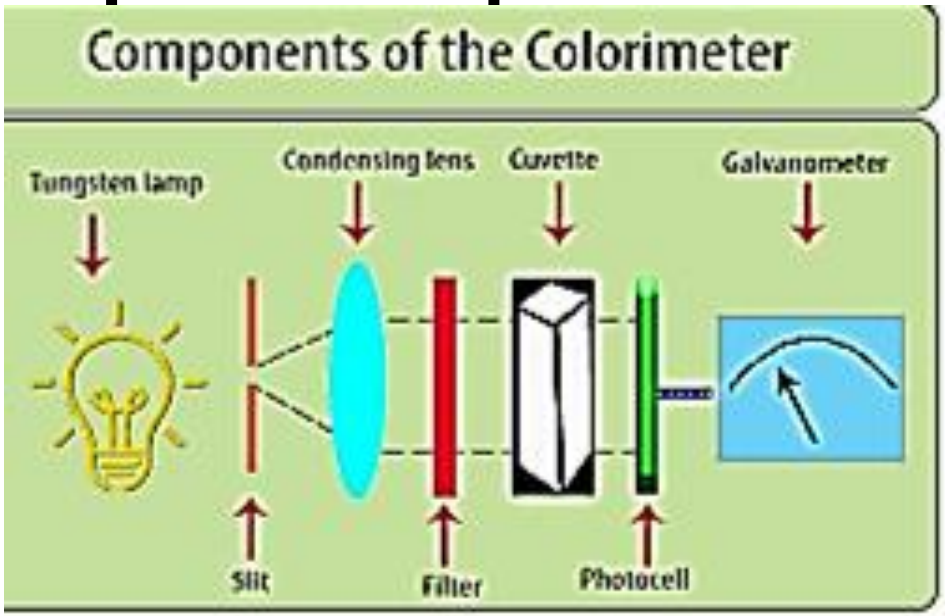
- Main cause of poor air quality in **summertime**
- Colorless gas → complex series of photochemical reactions (involving sunlight and heat)
- Not emitted directly into the air, a secondary pollutants.
  $(UV + O_2 \longrightarrow 2O)(O + O_2 \longrightarrow O_3)$
- The presence of air pollutants such as nitrogen oxides and VOC will stimulate the forming of ozone.

Procedure of collecting Ozone data



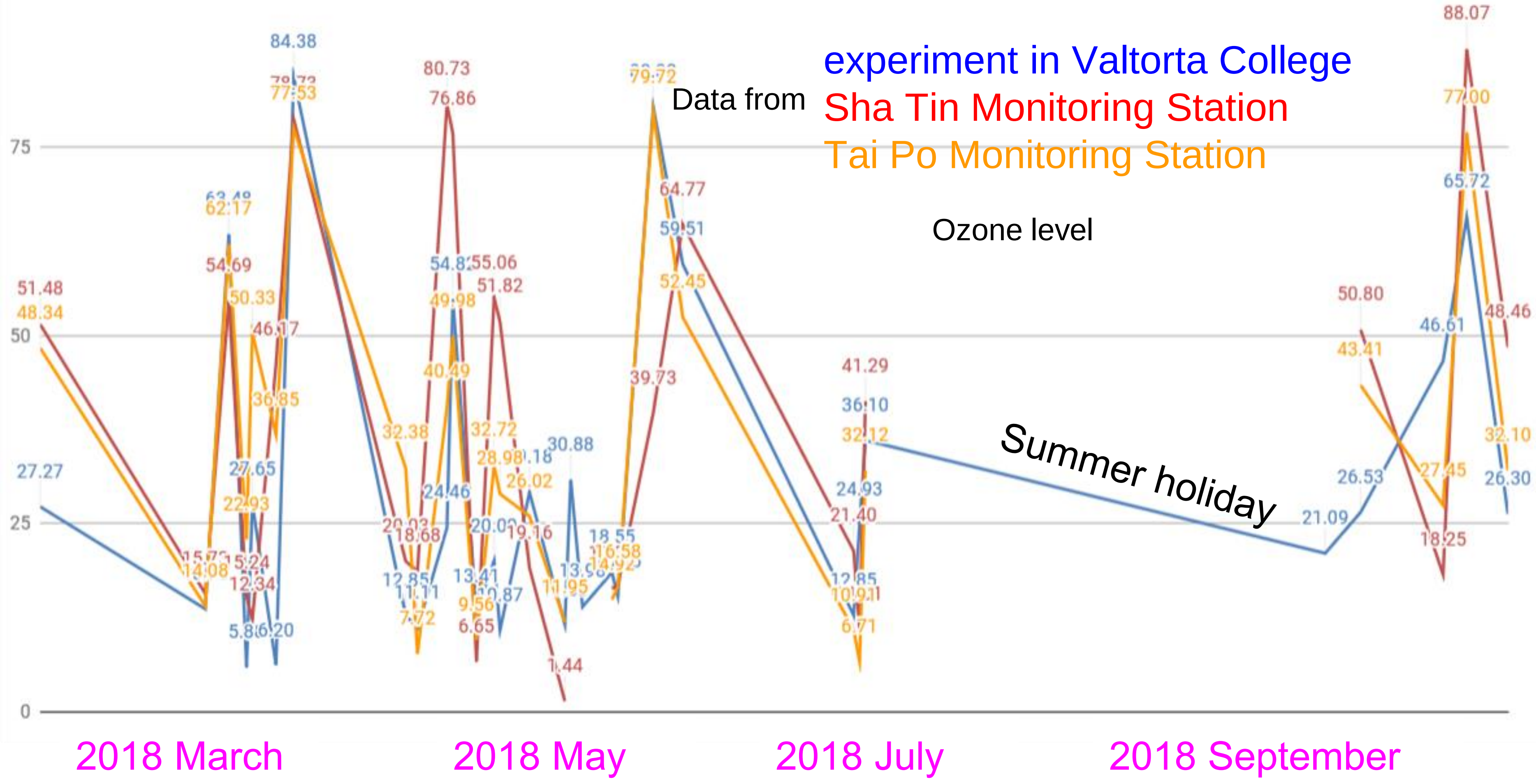
Ozone in air sample is captured by bubbling air stream through a buffered potassium iodide (KI) solution using a vacuum pump.
Therefore, blue colored [tri-iodidestarch] complex is formed.

spectroscopic methods

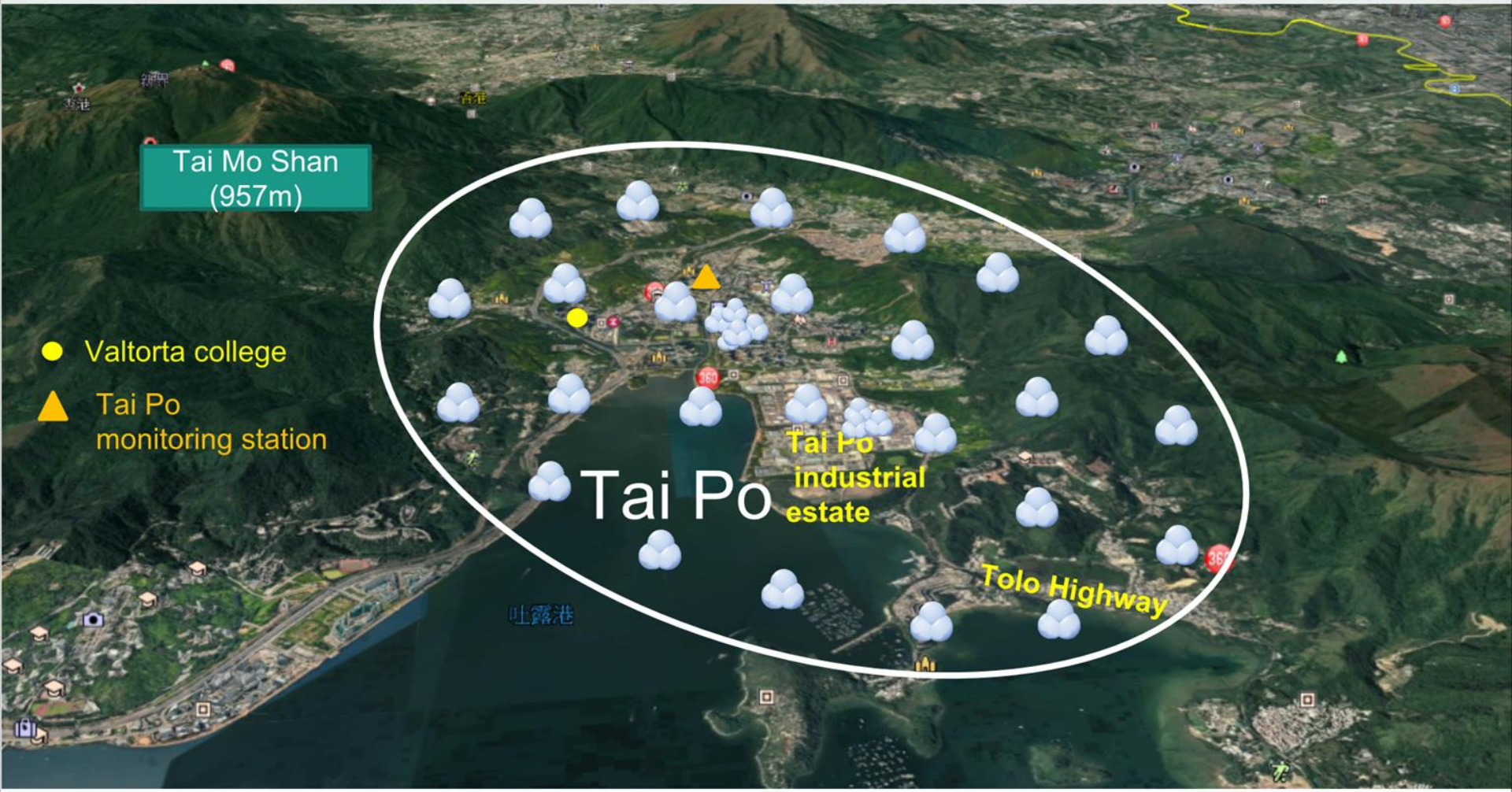


The blue colored [tri-iodidestarch] complex absorbs light at 574 nm (green light). With this property, it allows us to use spectroscopic methods.

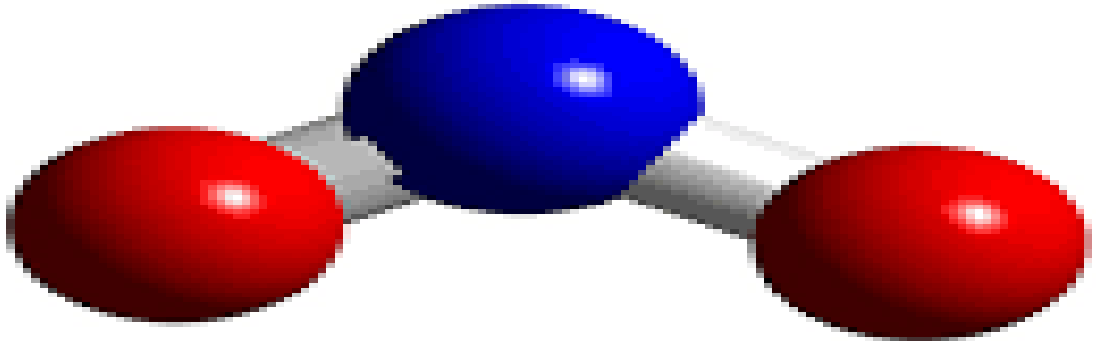
Determine the blue complex concentration (or how intense the blue color is) by measuring how much green light can pass through the blue complex solution.



Data from
experiment in Valtorta College
Sha Tin Monitoring Station
Tai Po Monitoring Station
Ozone level
Summer holiday
2018 March
2018 May
2018 July
2018 September


Tai Mo Shan
(957m)
Valtorta college
Tai Po
monitoring station
Tai Po
Tai Po
industrial
estate
Tolo Highway
吐露港

NO_2

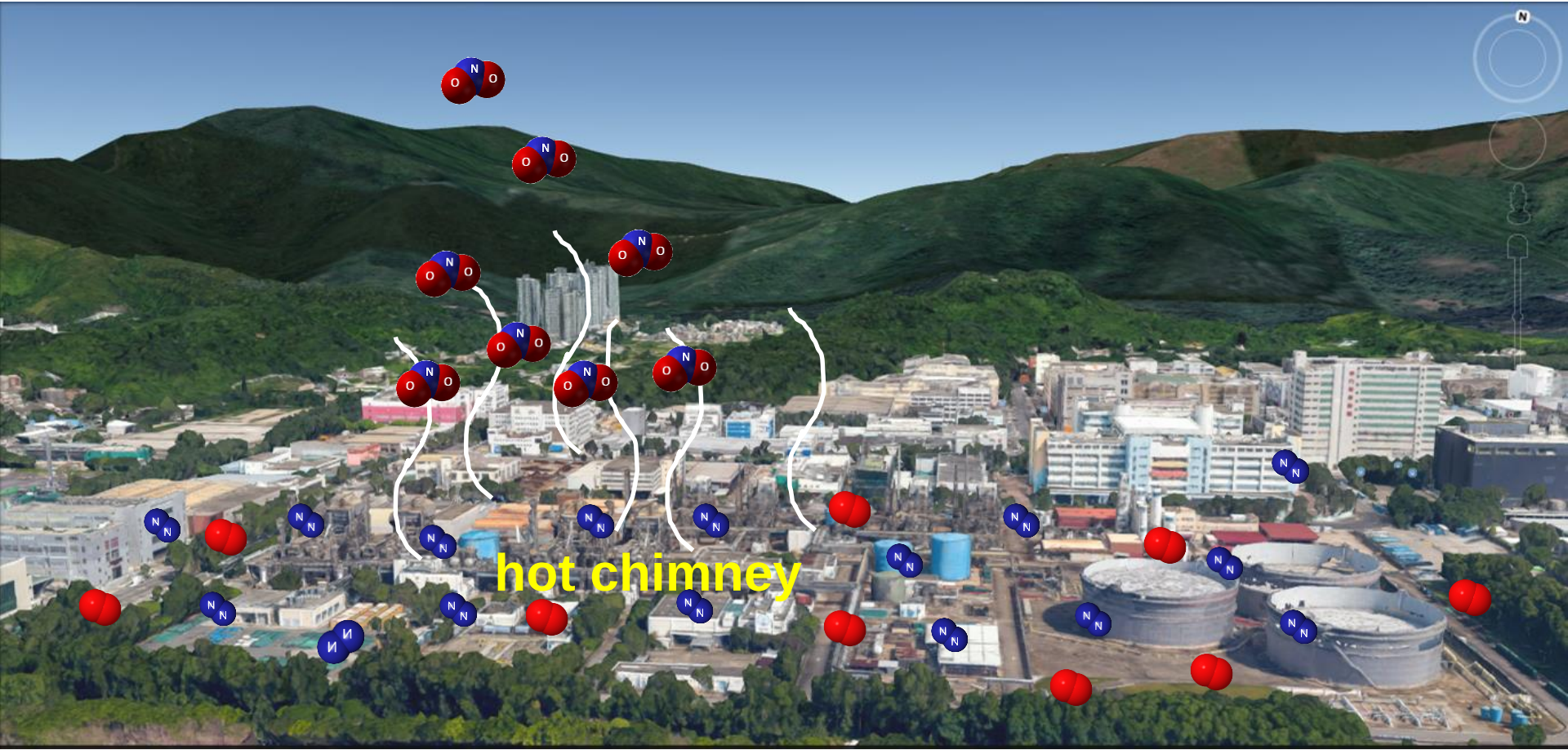


Nitrogen dioxide

NO_2 is mainly produced by reacting N_2 and O_2 at the high temperature or in the presence of spark

$N_2 + 2O_2 \longrightarrow 2NO_2$

Flow of NO_2

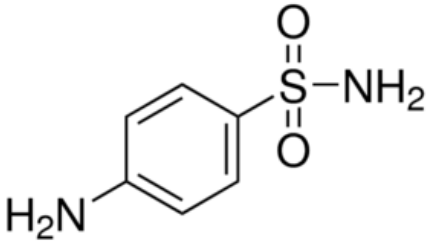


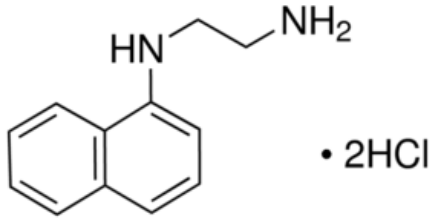
Procedure of collecting Nitrogen dioxide data

NO_2 in the air sample stream is captured by a glass fiber filter coated with triethanolamine (TEA) filter paper

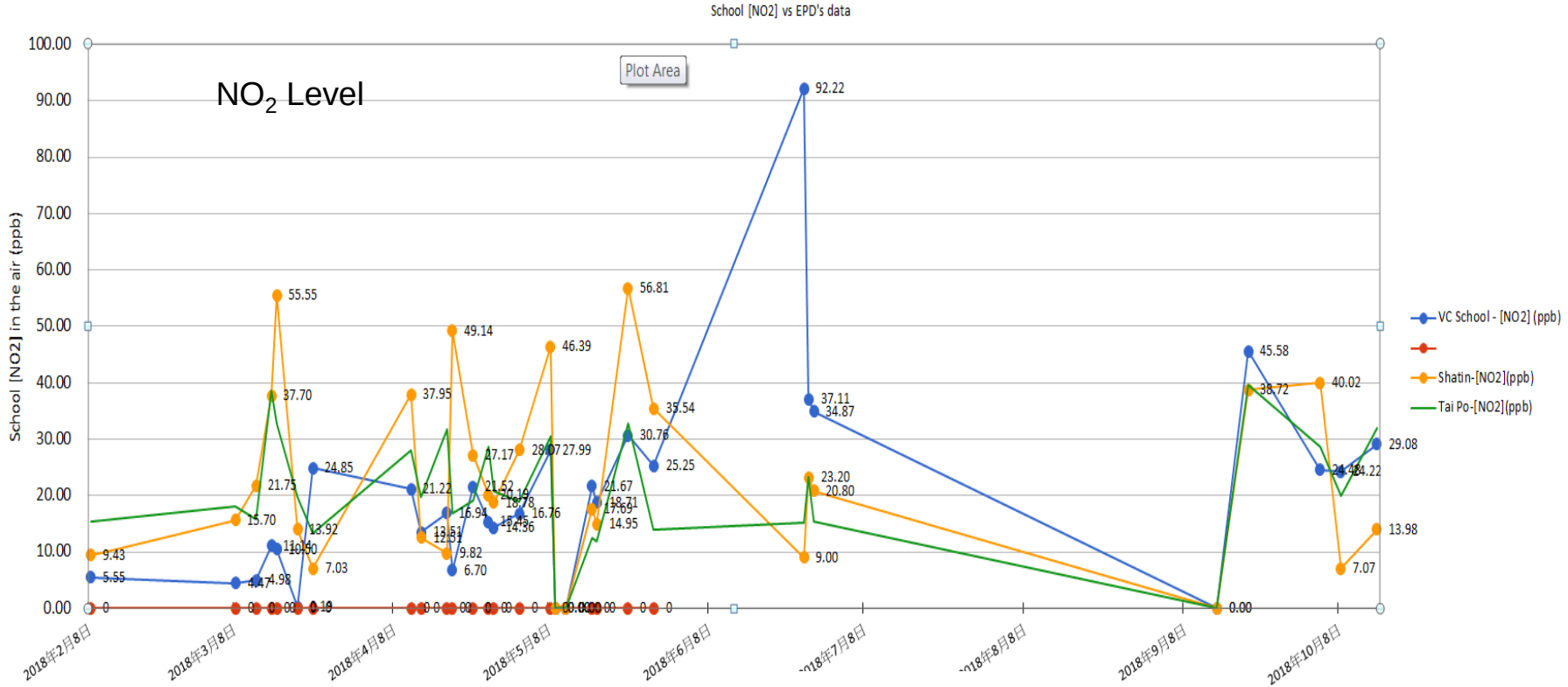
Dye indicators sulfanilamide and acidified N-(1-naphthyl)ethylenediamine dihydrochloride can help us determine the concentration of NO_2

Sulfanilamid





Acidified N-(1-naphthyl)ethylenediamine dihydrochloride



2018 March 2018 May 2018 July 2018 Oct

Valtorta College

Tai Po Monitoring Station

Sha Tin Monitoring Station

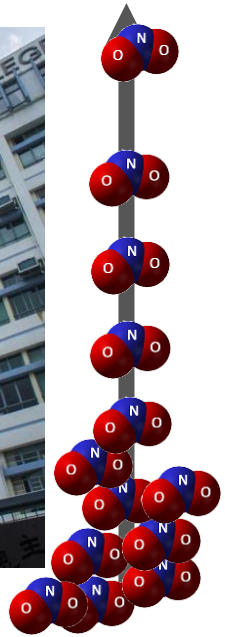
Ways of Comparison

- Distance
- Height
- Nearby area

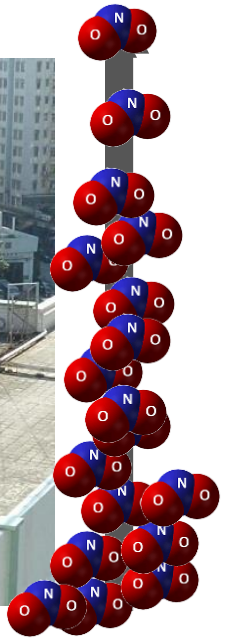
Distance


Tai Po
industrial esta
2.67 km
2.65 km
Tai Po
Monitoring station
VC
0
500.00 公尺
1.00 公里
1.50 公里
2.00 公里
2.50 公里
3.50 公里
4.00 公里
4.50 公里
5.00 公里
南坑
南坑村
竹坑
營盤下
新圍仔
魚角村
大埔頭
大埔頭水圍
太和邨
大埔太和路
汀角路
大埔海濱公園
香港回歸紀念塔
元洲仔公園
錦石新村
錦山村
香港鐵路博物館
忠信里
洋涌
大埔墟街市及熟食中心
雅麗氏何妙齡
那打素醫院

Height



42.7 m



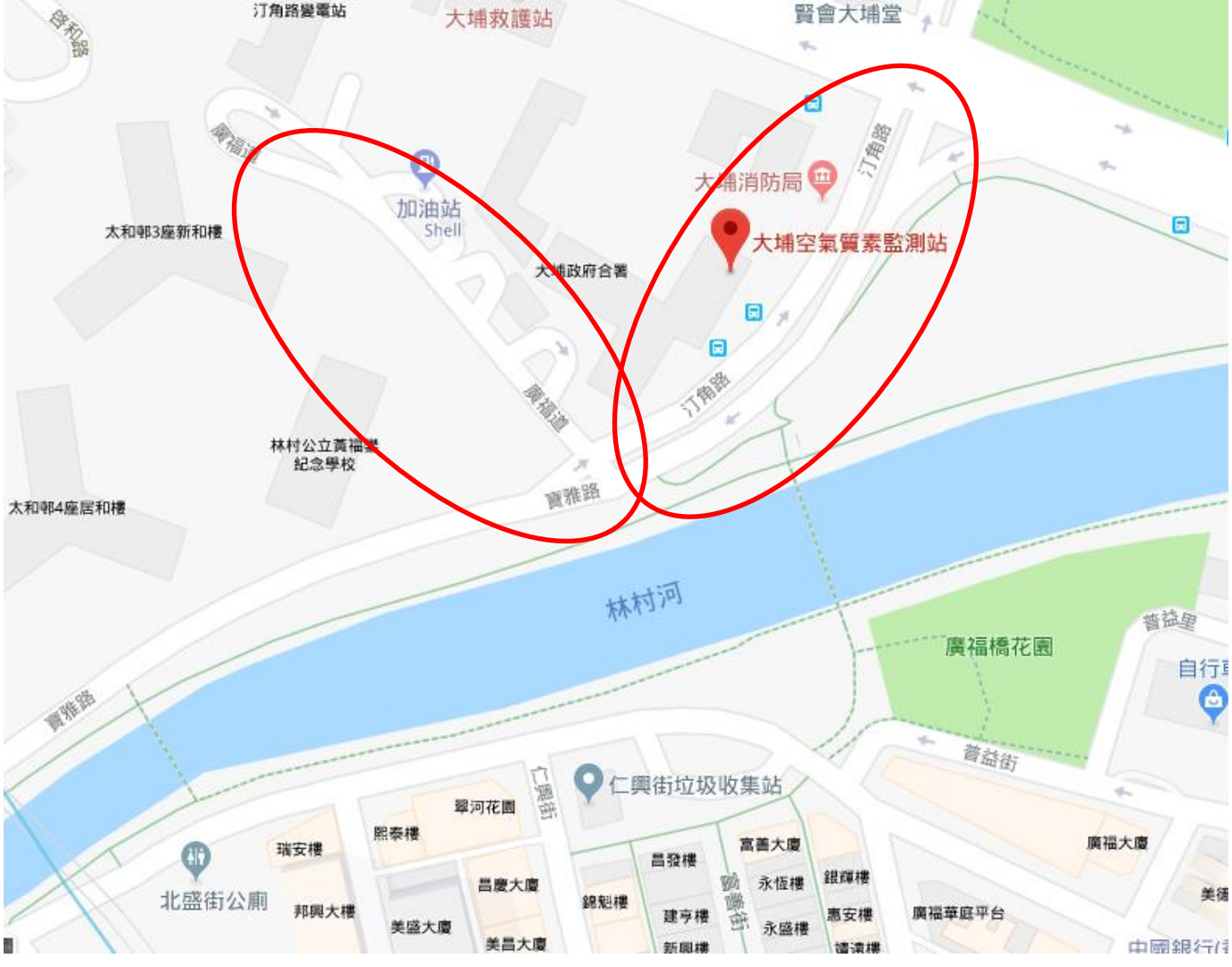
28 m

- 1 road
- Low traffic flow
- Have MTR only

(MTR → x pollution)

- More green area

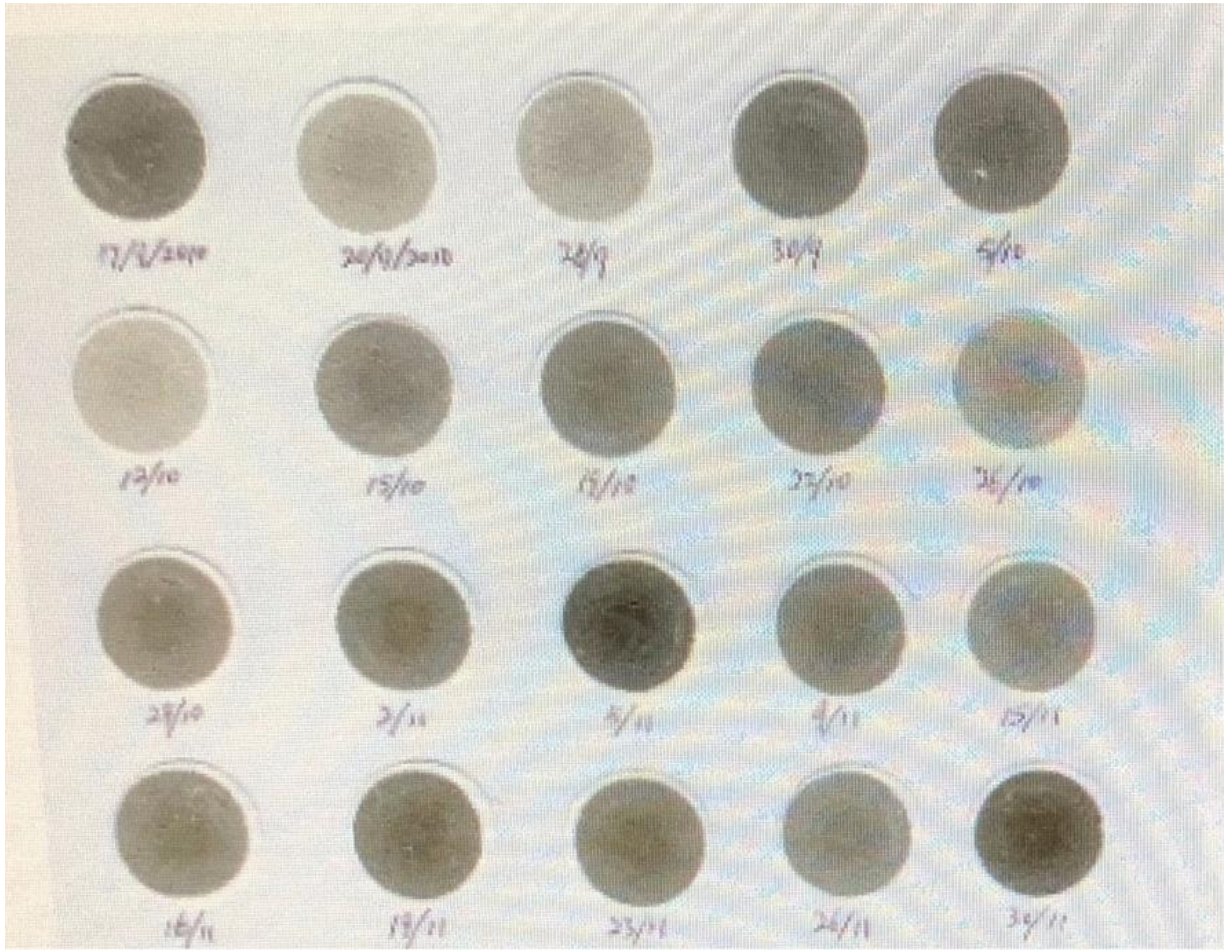
→ Less NO_2



- 2 roads
- High traffic flow
- less green area

→ More NO_2

BLACK CARBON

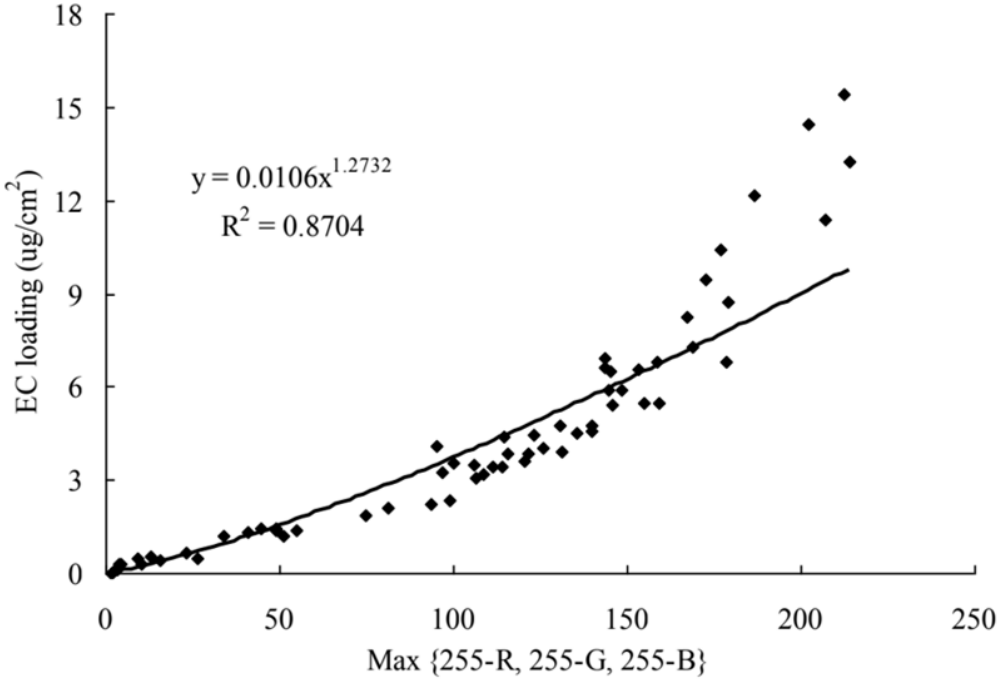


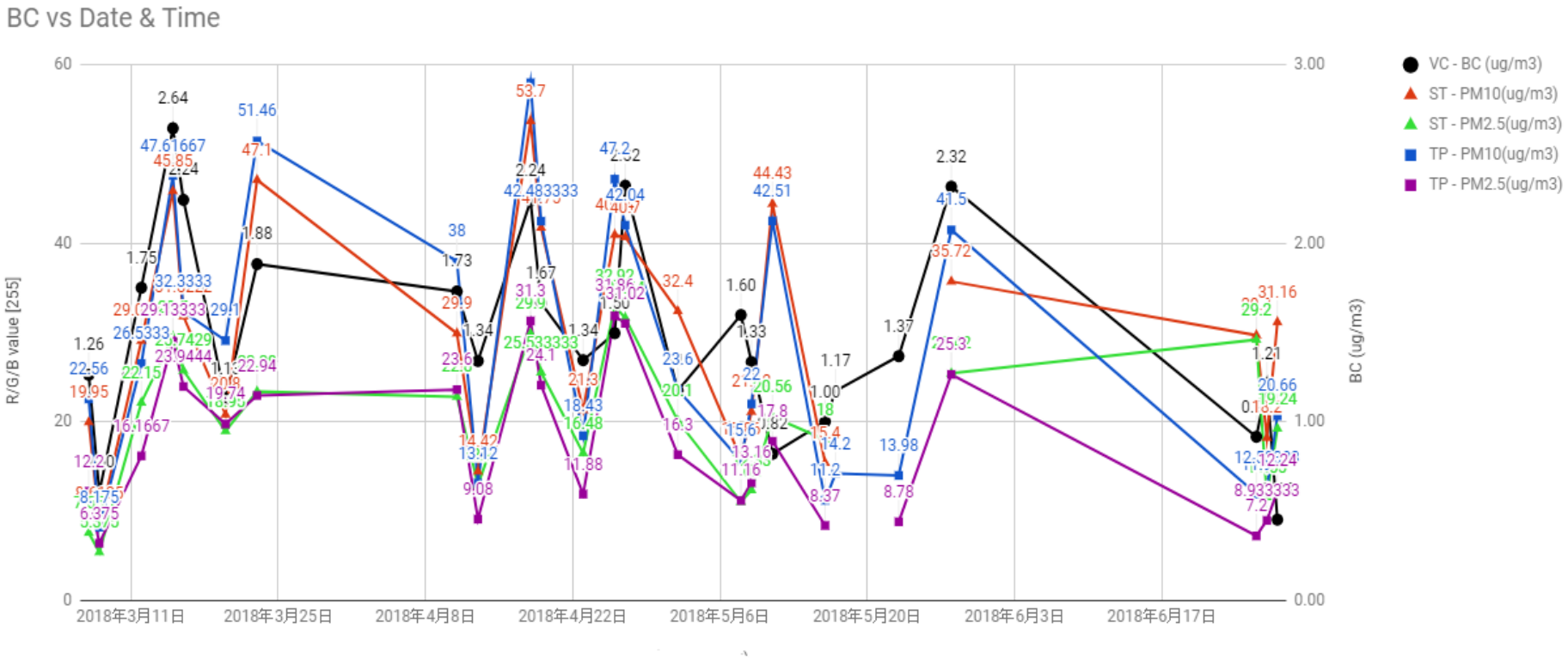
BLACK CARBON

- The industrial activities from the Tai Po Industrial Estate
- Solid particles are remain suspended in air for a long time.
- $PM_{2.5}$ material = primarily formed from chemical reactions in the atmosphere and through fuel combustion

PROCEDURE

The color of particles collected on a filter paper is digitized by a personal computer scanner to yield RGB values. The value of RGB shows positive result with the concentration of black carbon





The **trend** of the data collected by our school is **generally similar to** the data that collected by Tai Po Monitoring Station


Members
The End