

## Class 12: AQ-Measurements

18 October 2024 21:52

Major factors to be considered during air sampling

- Ambient or polluted
- Sampling site
- Sampling time

Type of air sampling

- Personal sampling
  - Inhalation volume, breathing zone of operator
  - Not due to work and if so, no problem (within distance)
  - Not in the sampling field should be detected
- Fixed-point
  - Can be used during sampling
- Stationary sampling
  - Fixed during sampling

Analytical Measurement

- Measurements of air quality generally fall into:
  - Direct sampling: Sample from a source is measured
  - Indirect air quality: Measures the quality of air in a particular place
  - Indirect hydrogen sampling: by rising the air quality index of hydrocarbons and photo of smoke
  - Urban sampling: to study the quality of air in busy zones

Types of measurement sampling

- Active sampling
- Passive sampling
- Continuous sampling
- Manual analysis

## Types of Ambient monitoring Stations

Station type	Measurement
Background station	Measure the background level of pollutants in the ambient air, away from any local sources of pollution.
Source-oriented station	Measure the concentration of pollutants near a specific source of pollution, such as a factory or road.
Urban background station	Measure the concentration of pollutants in the ambient air in an urban area, away from any local sources of pollution.
Rural background station	Measure the concentration of pollutants in the ambient air in a rural area, away from any local sources of pollution.
Coastal station	Measure the concentration of pollutants in the ambient air near a coastline, to monitor the impact of sea breezes.
Mountain station	Measure the concentration of pollutants in the ambient air in a mountainous area, to monitor the impact of weather conditions.

Location of all stations that atmospheric stations should be 10 to 100 m from any other station that provides the same information as the station in question.

Active Sampling

- Pumped Sampling
- Analytes are physically pulled into the sample using an air sampling pump
- Concentration of analytes can come out of solids (adsorbents, filters)

Passive Sampling

- Diffusive sampling
- Analytes enter the sampler unassisted due to molecular diffusion
- Many active sampling pumps/samplers don't require electricity
- The measured analytes can be detected off the substrate by solvent or thermal desorption

Particulate Matter Sampling

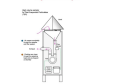
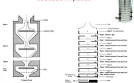
- Gravimetric based
- High accuracy based

Working principle of gravimetric PM sampler

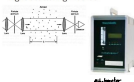
- Samplers work on the principle of inertia
- Air is drawn into



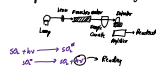
- 50% of aerosol impinge on flat plate
- Particle larger than cut size stops across the chamber and impinge the plate
- Smaller particles follow the chamber

High Volume SamplerCascade ImpactorWorking principle of gravimetric PM sampler

- Gravimetric
  - 50% of air impinge on flat plate
  - Particle larger than cut size stops across the chamber and impinge the plate
  - Smaller particles follow the chamber
- Gravimetric
  - 50% of air impinge on flat plate
  - Particle larger than cut size stops across the chamber and impinge the plate
  - Smaller particles follow the chamber

Respirable dust samplerLight Scattering methodMeasurement of gasesSafety Precautions (or Warnings)

- Do sample when the weather is clear and there is no rain
- No immediate release when it is exposed to air
- No release to the atmosphere
- The use of Personal Protective Equipment (PPE)

Order of Nitrogen (Chromatography)

- Flaming sample can be used to convert NO<sub>x</sub> to NO
- Sample the ambient air containing NO<sub>x</sub>, O<sub>2</sub>, and NO<sub>2</sub> at the same time
- Position of NO<sub>x</sub> with oxygen is a dark colored chamber
- Infrared light
- Flaming the oxygen is passed to convert the light signal
- It is directly proportional to the concentration of NO<sub>x</sub>

Other

- Other by chemiluminescence methods or direct reading UV detection
- Chemiluminescence method: Sample drawn into a mixing chamber mixed with a stream of O<sub>2</sub> - causes a chemiluminescence reaction and the integrated mixed light is passed to a detector
- Direct reading UV method: Sample of gas in the sample is drawn through a flow cell where it is irradiated with UV light at 254nm

Gas flow measurement

- Non-dispersive infra red sensors
- Sample through a flow cell in the instrument where it is irradiated with IR

Tag gases

- Flowable gases designed for the collection of various particles into a liquid medium
- When using tag gas sampler, a known volume of tag gas is pumped through the flowable liquid causing a liquid gradient in the medium
- The liquid is then analyzed to determine various concentrations

Flowable	solvent
NO <sub>2</sub>	nitrobenzene
NO <sub>2</sub>	nitrobenzene

$\text{Mn}$   
 $\text{H}_2\text{S}$   
 $\text{Cl}_2$

e / h  
 Sulfuric acid  
 Cadmium hydroxide  
 Methylorange





