Air Pollution Control Techniques

Lecture 2

Definition – Air Sampling

- **Air sampling** is a method used to find out what airborne contaminants are present in your environment.
- **Air** is collected by using various methods and then, it is tested for the presence and concentration of hazardous substances and microorganisms.

Sampling

Classification of sampling methods:

1. Sampling of **impurities of every nature** (Ranging from particulate matter to gases)

2. Sampling under various **environmental conditions** (ranging from samples taken from chimneys to samples taken in the open air)

3. Sampling methods varying according to the **time factor** (Ranging from intermittent to continuous sampling)

Sampling

Air Quality measurement is undertaken in two situations: (1) Ambient air quality measurement (2) Stack monitoring

Ambient air quality measurement: Where the pollutant levels in the ambient atmosphere are measured.

Stack sampling: It deals with the pollutants emitted from a source such as smoke stack and is known as stack sampling.

It provides information on the nature and quantities of various pollutants that are emitted into the atmosphere.

Sampling

Air quality monitoring:

Sampling and measurement of air pollutants generally known, as air quality monitoring.

It is an integral component of any air pollution control programme.

Important of Monitoring :

- Air quality can be evaluated
- Information is helpful in implementing control measures for reducing pollutant concentration to acceptable levels
- Assessing the effect of air pollution control strategies

Sampling

Difficulties encountered in sampling:

- Collecting samples of true representative character
- Errors arising from methods used for the collection and separation of the various components of pollution.
- Difficulty in preventing any change in the concentration of particulate matter in suspension, as a result of sampling operation.

Sampling

Preliminary considerations and stages of sampling:

Following principles should be followed to ensure correct sampling

1. Statistical studies

- Å Important to establish the basic data e.g. size and frequency of sampling
- Å It use the basic principles of the probability

2. Size of samples

- Å The sample should be large enough to make analysis possible.

Sampling

3. **Change in the sample during and after sampling**
4. **Continuous and intermittent sampling**

   An automatic continuous recording apparatus is preferable.

5. **Sampling of volatile constituents**

   Carry out sampling with large volumes of air (to avoid error)

6. **Sampling of particulates**

   Errors may be introduced due to agglomeration or breaking up of particulate matter.

Sampling

In order to eliminate the sources of error

- Sampling should be carried out under conditions that are as **iso- kinetics** as possible
- A gas stream should be sampled as far as possible in the **same direction and at the same speed** itself but never counter-current
- The collection surface should be as **close as possible to the source** of the gas stream.
- To avoid reducing the efficiency of sampling, **deposits and condensation should not be allowed** to form on the walls of sampling vessels.

Sampling

Sampling of waste gas

- **Difficulties** are encountered due to high temperature, lack of uniformity in the composition of gas flow and difference in speed due to disturbances.

- **Hence to avoid error**, the **gas stream should be sampled at several points and maximum number of samples should be taken** to get the average value.

Sampling

Sampling in the open air

Difficulties arise due to

- High dilution of the pollutants dispersed in air
- Consequent need to collect large number of samples
- Difficulty of sampling under iso-kinetic conditions.

To minimize the error of sampling **continuous recording instruments** should be used and samples should be collected at various places.
Also **meteorological data** like wind speed and direction, should be collected to know their effects on dilution or concentration of pollutant in the air.