

SAMPLING AND ANALYSIS OF INDUSTRIAL WASTES

WATER REQUIREMENTS OF DIFFERENT INDUSTRIES

- The agro-based industry is characterized by its **water intensive** nature. The industry consumes considerable quantities of water for their processes.
- Apart from **process water requirements**, large volumes of water are use **for cleaning and washing** purposes.
- Volumes of water consumed vary widely from plant to plant within the segments of the **agro-based** industry. There are significant variations between these segments also.

S. No.	Industry	Specific Water Consumption (Cubic meters)	Waste Water generation, Cubic Metre	Pollution load (in terms of Kg of BOD)
1.	Dairy (Integrated) (per kilo litre of milk)	8.7	6.0	11.0
2.	Edible Oils & Vanaspati (per tonne oil)	3.0	2.0	7.5
3.	Fermentation (i) Brewery (per Kilo litre of beer)	11.5	9.5	24.0
	(ii) Distillery (per kilo litre of alcohol)	130.0	90.0	600.0
	(iii) Maltry (per tonne of grain)	8.5	3.5	2.0
4.	Pulp & Paper (per tonne of Paper)	300.0	250.0	375.0
5.	Starch (Maize Products) (per tonne of maize)	8.0	5.5	44.0
6.	Sugar (Per tonne of cane crushed)	2.0	0.4	0.5

WASTE CHARACTERIZATION

- Wastes characterization is the term used for the process of **determining the chemical, biological, and physical characteristics, as well as the quantity, mass flow rates, strengths** (in terms of concentration), and discharge schedule of a wastewater stream, air discharge, or solid waste stream.

- The foundation of the study is a **sampling and analysis program**, which must be performed on representative samples.
- The equipment used to measure **rates of flow** and to physically obtain samples must be appropriate to the application and accurately calibrated.
- 'Sampling', which is the process used to **select a small portion of water** or wastewater for the purpose of determining the **characteristics of an entire batch** of water or wastewater.

LOCATION OF SAMPLING

- The location from which you take samples will, of course, depend on what you want to discover about the water.
- **Example - Operators take samples of raw** water to determine water characteristics which will influence the **treatment procedure**, then they take samples of **finished water** to determine how well the treatment worked.

SAMPLING POINTS

- Samples from channels are taken at **two-thirds the depth** of the flow at a point free from back eddies.
- Samples of **digester sludge** are collected at **3- to 5-foot** intervals, starting at the top and working down to avoid agitating the sludge from which the succeeding samples are taken

TYPES OF SAMPLING OR SAMPLES

- There are two types of sampling techniques
 1. **Grab samples**
 2. **Composite samples**

GRAB SAMPLING

- Grab sampling is just **what it sounds like**; all of the **test material is collected at one** time.
- As such, **a grab sample reflects** performance only at the **point in time** that the sample was collected, and then only if the sample was **properly** collected.


WAYS TO TAKE GRAB SAMPLES


- **No special equipment** is needed. Usually, a **sampling container** is used to take the sample.
- The container can be **dipped directly** into the water or a sampling rod can be used to collect the water and fill the container.
- Samples are then **packed in a cooler box** with **ice** and taken for testing.
- Grab sampling is used to provide **information about the water at one point** in time.



Poles are useful for sampling in basins (above) or in drains or wells (below.)



- 
- A grab sample has certain limitations.
 - In short, a grab sample takes a snapshot of the characteristics of the water at a specific point and time, so it **may not be completely** representative of the entire flow.
 - **Grab samples are most appropriate to small plants with low flows and limited staffs who** cannot perform continual sampling.
 - On the other hand, grab samples do provide an **immediate sample**, and are thus to be preferred for some tests.

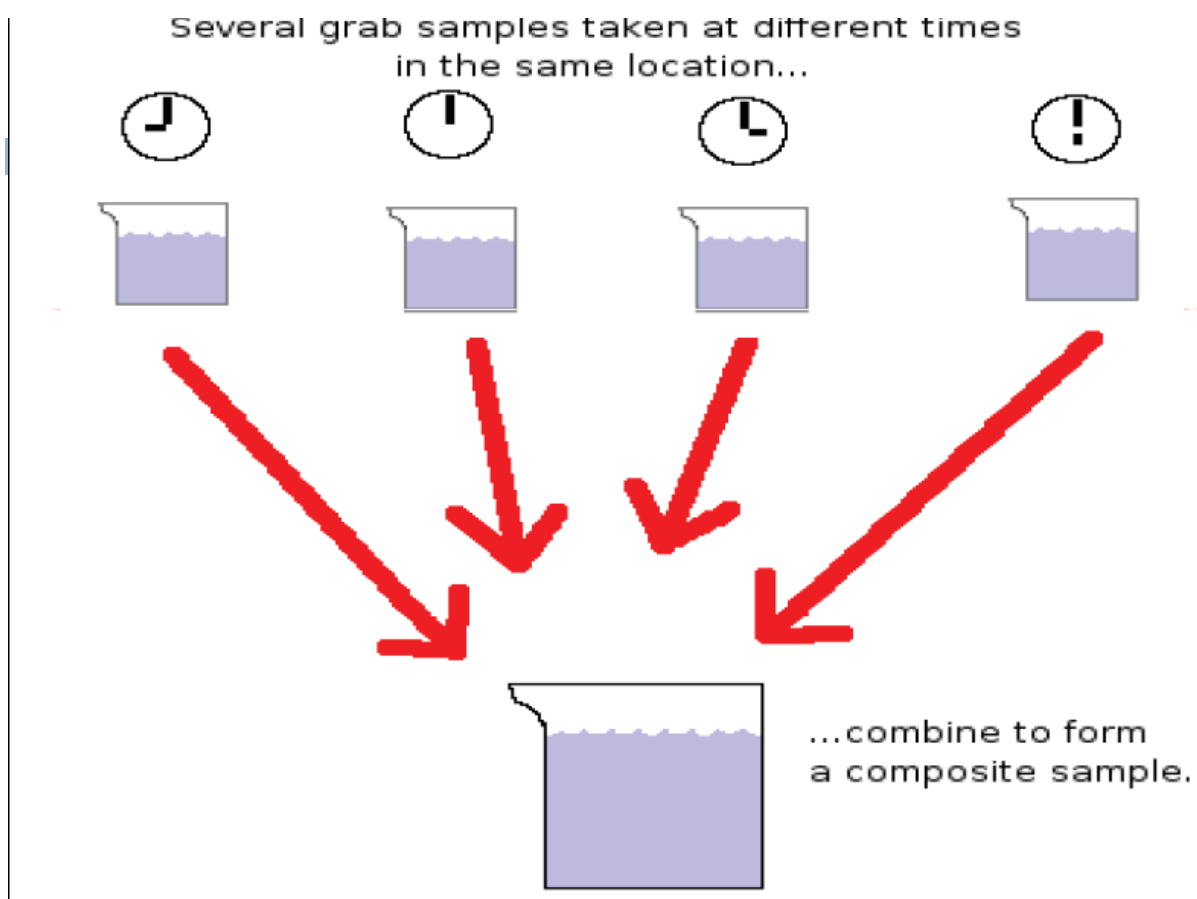
- 
- Specifically, **pH, dissolved oxygen, and total residual chlorine can** change very rapidly in water once the sample is removed from the flow, so grab samples are preferred for these tests.
 - Grab samples must be **collected carefully** to make them as representative as **possible of the water** as a whole.
 - They should be taken at a **time of day** when the plant is operating **near its average daily flow** rate.

- If grab samples are used to **determine plant efficiency** by collecting a **raw water** sample and a **treated water** sample, then the collection of the effluent should be **delayed long enough** after collection of the influent sample to allow for the **raw water to pass** completely through the treatment process.
- Finally, be aware that **mixing two or more grab** samples **may not** result in a result which **averages** the characteristics of the samples.
- Chemical reactions can take place in mixed samples **which alter pH and chlorine residual values.**

COMPOSITE SAMPLING

- Composite sampling involves taking a **number of small samples**, called **sub-samples**, over a period of time.
- Composite sampling consists of a collection of numerous **individual discrete samples** taken at regular intervals over a period of time, **usually 24 hours.**

- The material being sampled is collected in a **common container** over the sampling period.
- The analysis of this material, collected over a period of time, will therefore represent the **average performance of a wastewater treatment plant** during the collection period.



- The greatest strength of composite samples is their ability **to take into account changes in flow and other characteristics of the water over time.**
- This helps the operator gain an **overall picture of the total effects** that the influent will have on the treatment process and that the effluent will have on the receiving water.
- However, **composite samples cannot be used** for tests of water characteristics which change during storage (such as dissolved gases) or of water characteristics which change when samples are mixed together (such as pH).

TDS



After filtration,
24 hrs, 105 deg C in hot air oven

Do Meter



Do Range





THEORY QUESTIONS

- Q1. Give tabular data for different agro based industries and their water usage and wastewater generation rates.
- Q2. Explain in detail *grab sampling and Composite sampling*.