

بسم الله الرحمن الرحيم



AL-BALQA' APPLIED UNIVERSITY

AL-HUSON UNIVERSITY COLLEGE

WATER & ENVIRONMENTAL ENGINEERING DEPT.

WATER & WASTEWATER TREATMENT LAB.

EXPERIMENT (3)

TURBIDITY

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- **Abstract:**

- TURBIDITY is a measure of the cloudiness of water, and it's caused by suspended matter and organic matter and by plankton and other microscopic organisms.
- Turbidity is measured in Nephelometric Turbidity Units (NTU).

- **Introduction:**

- Turbidity is a measure of the cloudiness of water (the cloudier the water, the greater the turbidity). Turbidity in water is caused by suspended matter such as clay, silt, and organic matter and by plankton and other microscopic organisms that interfere with the passage of light through the water. Turbidity is closely related to total suspended solids (TSS), but also includes plankton and other organisms.
- Typical sources of turbidity in drinking water include waste discharges, runoff from water sheds, algae or aquatic weeds, humic acids and other organic compounds resulting from decay of plants, high iron concentrations and air bubbles and particles from treatment processes.
- Simply stated, turbidity is the measure of relative clarity of a liquid. Clarity is important when producing drinking water for human consumption and in many manufacturing uses.
- Turbidity itself is not a major health concern, but high turbidity can interfere with disinfection and provide a medium for microbial growth. It also may indicate the presence of microbes
- Turbidity consists of two major stages that are flocculation which is the process of transport of particles, and the other one is coagulation which is the process of attachment of particles to each other.

- **Theory:**

- The process of flocculation and coagulation is as following:
 1. Stable particles, are placed in equal spaces between each other.
 2. Destabilization, which is the flocculation by adding aluminum sulfate (Alum), or ferric chloride.
 3. Re-stabilization, which is the process of coagulation or attachment.
- To find the optimum dosage of alum, we have to lock all other parameters such as pH, alkalinity, temperature and time; and change the alum parameter.
- Two factors should be taken into considerations, the first one is the rapid mixing (at 300 RPM for 30 sec) to make the solution homogenous. The other one is slow mixing (at 10 RPM for 20 min, and 5 RPM for 20 min) for coagulation.
- Percentage removal of turbidity can be calculated by:

$$\% \text{ Removal} = \frac{T_i - T_f}{T_i} \times 100\%$$

- **Procedure:**

As in standard methods.

- **Data and results:**

sample	T_i	T_f	% Removal
1	60	10.5	82.5
2	60	3.1	94.8
3	60	2.3	96.2
4	60	4.9	91.8
5	60	3.5	94.2

Sample of calculations:

$$\%Removal = \frac{T_i - T_f}{T_i} \times 100\% = \frac{60 - 10.5}{60} \times 100\% = 82.5\%$$

- **Discussion and conclusion:**

- Turbidity is a principal physical characteristic of water and is an expression of the optical property that causes light to be scattered and absorbed by particles and molecules rather than transmitted in straight lines through a water sample. It is caused by suspended matter or impurities that interfere with the clarity of the water. These impurities may include clay, silt, finely divided inorganic and organic matter, soluble colored organic compounds, and plankton and other microscopic organisms.
- Turbidity in water usually comes from natural sources resulting from soil runoff. It is generally a very fine or even a colloidal suspension in water. There can also be insoluble organic matter that can also contribute to turbidity. Living plants like algae and organisms like bacteria can also contribute to turbidity.
- Turbidity, unlike color, is relatively easy to remove from water. It is negatively charged and can be coagulated with a strong cationic product.
- The idea of turbidity removal is the same as the principle of treatment which to convert the dissolved matter to a settleable matter that can be settled down.
- Major factors affect the settling of coagulated particles which are the volume and the density of the particle.