

## EXPERIMENT NO: 10

### EVALUATION AND TOXICOLOGICAL ANALYSIS OF WATER – 1

Water analysis is carried out following the steps below;

1. Sensory and physical examination;
2. Physico-chemical analysis: pH, electrical conductivity;
3. Chemical analysis: It is done to investigate the nature of water and its drinkability in terms of health. For this purpose, the following substances are investigated in the water sample.
  - a) metals, cyanide
  - b) fluoride and nitrate
  - c) hardness, chloride and disinfecting agents
  - d) total organic substance, ammonia and nitrite

#### 1. Determination of Nitrite in Water:

- *Qualitative determination with Trommsdorf reagent:*

10 mL of sample + 1mL of reagent + 1-2 drops of phosphoric acid ----- wait for 10 minutes  
The formation of blue color indicates the presence of nitrite.  
This test is applied to non-chlorinated water.

- *Quantitative determination by diazotation method:*

The nitrite anion is determined on the basis of the color of the red-pink azo dye given by diacylated sulphanylic acid with  $\alpha$ -naphthylamine in pH 2-2.5. The resulting color follows Beer's law up to 0.5 mg/l nitrite content.

Standard sodium nitrite solution: 0.001 mg/ml nitrite.

Take 0,1,2,3,4,5 ml standard sodium nitrite solution (in the graduated cylinder). Make the volume of the solution 10 ml with distilled water. Solutions content: 0.1, 0.2, 0.3, 0.4, 0.5 mg/l nitrite

Take 10 ml water sample. Add 1mL of diazo reagent to each tube. After 30 minutes, the colors are compared using the colorimeter (or eye).

The result is given in mg nitrite ( $\text{NO}_2^-$ ) per liter

#### 2. Determination of Nitrate in Water:

- *Tilmans and Suthoff method:* (For 0-2.5 mg nitrate per liter)

It is determined based on the blue color of the nitrate anion with the diphenylamine-sulfuric acid reagent.

Standard sodium nitrate solution: 0.01 mg / ml nitrate.

Take 0, 0.5, 1, 1.5, 2, 2.5 ml standard sodium nitrite solution (in the graduated cylinder). Add 0.2 mL of saturated sodium chloride solution and 1 ml of glacial acetic acid. Make the volume of the solution 10 ml with distilled water.

Take 10 ml water sample. Add 2 mL of saturated sodium chloride solution and 1 ml of glacial acetic acid.

Take 1 ml of sample and 1 ml of standard solution. Add 4 ml diphenylamine-sulphuric acid reagent to each tubes. After 60 minutes, the colors are compared using the colorimeter (or eye).

The result is given as mg nitrate ( $\text{NO}_3^-$ ) per liter.

### **3. Determination of Ammonia in Water:**

Ammonium ions form a yellow-brown color ( $\text{NH}_2\text{HgI}_3$ ) with Nessler's reagent ( $\text{K}_2 [\text{HgI}_4] \text{KOH}$ ). Absorbance of this color is measured to determine the amount of ammonia. The method is very sensitive and suitable for 0.5 - 2.5 mg  $\text{NH}_4^+$  per liter.

Standard ammonium chloride solution: contains 0.01 mg / mL  $\text{NH}_4^+$

Take 0, 0.5, 1, 1.5, 2.2.5 mL standard ammonia chloride solution (in the graduated cylinder). Make the volume of the solution 10 ml with distilled water.

Take 10 ml water sample. Add 0.2 mL of Seignette salt solution. Add 0.4 mL Nessler reagent to each tube and mix. The colors are compared using the colorimeter (or eye).

The result is given as mg  $\text{NH}_4^+$  per liter.