Experiment 2
Determination of Color in Water



Introduction:

Pure water should not have any color. Color in water may result from the presence of natural metallic ions (iron and manganese), humus and peat materials, plankton, weeds, and industrial wastes. Impurities in water may exist either in the colloidal form or in the suspended state. Color caused by dissolved and colloidal substances is referred to as "true color," and that caused by suspended matter, in addition to dissolved and colloidal matters, is called "apparent color," as it can be easily removed by filtration. Groundwater may show color due to the presence of iron compounds. The color value of water is extremely pH-dependent and invariably increases as the pH of the water is raised. For this reason, recording pH along with color is advised.

Environmental significance:

Though the presence of color in water is not always harmful to humans but in most cases it is. Even if the water is not harmful, aesthetically, people do not prefer to use water with color. Moreover, disinfection by chlorination of water containing natural organics (which produces color) results in the formation of tri-halomethanes, including chloroform and a range of other chlorinated organics, leading to problems which is a major concern in water treatment. So, it is important to limit the color of water for domestic supplies.

Guideline:

According to Bangladesh Environment Conservation Rules (2023), the drinking water guideline value for color is 15 Platinum-Cobalt (Pt-Co) Units.

Theory on experimental method:

- **Spectrophotometric method**

The platinum-cobalt method is useful for measuring the color of potable water and of water in which color is due to naturally occurring materials. It does not apply to most highly colored industrial wastewaters. In the laboratory color of water is usually measured using a spectrophotometer, which uses the light intensity of a specific wavelength (455 nm). The color test measures (inversely) an optical property of water sample which result from the absorption of light of specific wavelength by the soluble color substances present in water, Before, measuring the color of water it is necessary to plot standard calibration curve for color using different standard platinum-cobalt solutions of known concentrations within the range of interest.

Apparatus:

1. Color Disk
2. Filtration system including filter paper, funnel, holder, beaker etc.

Reagent:

1. Standard potassium chloro-platinate solution

Procedure:

1. Prepare standard samples having color within a specific range by mixing different concentrations of standard potassium chloroplatinate solution with distilled water. Using these samples to prepare a color calibration curve (absorbance vs. color concentration) for the spectrophotometer.
2. Take 50 mL of filtered test sample in a beaker. Take 50 mL of distilled water in another

beaker. Use this sample as a blank.
3. Set the spectrophotometer to determine the color concentration of the sample.
4. Put the blank sample inside the spectrophotometer cell and set the reading "zero".
5. Bring out the blank sample and place the test sample inside the spectrophotometer
6. After a While, the display will show the color concentration of the sample.

Assignment:

1. Discuss the environmental significance of color.
2. Discuss briefly the causes of color in water. Define true color and apparent color. Why is true color more important than apparent color?
3. Write down the methods that are commonly used for removing color from water and wastewater.