**COLOR MEASUREMENT**

**Introduction:**

Pure water should not pose 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 from or in suspended state. Color caused by dissolved and colloidal substances is referred 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. Ground water 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 presence of color in water is not always harmful to human 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. According to Bangladesh Environment Conservation Rules (1997), drinking water guideline value for color is 15 Pt-Co Unit.

**Theory on experimental method:**

Available methods for determining color of water:

***1. Standard Color Solutions Method***

***2. Dilution Multiple Method***

***3. Spectrophotometric method***

***1. Standard color solution method***

Waters containing natural color are yellow-brownish in appearance.

**Standard Color Solution**: Solutions of potassium chloroplatinate (K2PtCl6) tinted with small amounts of cobalt chloride yield colors that are very much like the natural colors. In this method, the color produced by 1 mg/l of platinum (as K2PtCl6) and 0.5mg/l of cobalt (as CoCl2•6H2O) is taken as the standard one unit of color.

Usually, a stock solution stock solution of K2PtCl6 that contains 500mg/l of platinum is prepared, which has a color of 500 units. Then, a series of working standards may be prepared from it by dilution.

Color -comparison tubes are usually used to contain the standards. A series ranging from 0 to 70 color units is employed and samples with color less than 70 units are tested by direct comparison with the prepared standards. For samples with a color greater than 70 units, a dilution is made with distilled water distilled water to bring the resulting color within the range of the standards. In this case, the final result should be corrected using a dilution factor.

***2. Dilution multiple method***

Color of most domestic and industrial waste waters are not yellow-brownish hue.

Other systems of measurement have to be used to measure and describe colors that do not fall into this classification.

For dilution multiple methods, color is measured by successive dilutions of the sample with color -free water until the color is no longer detectable comparing with distilled water. The total dilution multiple is calculated and used to express the color degree.

***3. Spectrophotometric method***

The platinum-cobalt method is useful for measuring color of potable water and of water in which color is due to naturally occurring materials. It is not applicable to most highly colored industrial wastewaters. In the laboratory color of water is usually measured using spectrophotometer which uses 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.

**Materials required:**

**Reagents:**

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**Apparatus:**

#Spectrophotometer (HACH, DR 5000)

**Procedure:**

1. Set the spectrophotometer to determine color concentration of the sample.

2. Put the blank sample inside the spectrophotometer cell and set the reading "zero''.

3. Bring out the blank sample and place the test sample inside the spectrophotometer

4. After a While the display will show the color concentration of the sample.