

Chapter IIntroductionGeneral Introduction

The justified demand for greater efficiencies of water and sewage treatment plants and the necessity of relieving the complicated operating devices and investigating a simple and a low cost treatment method results in the development and modification of aeration equipments.

The introduction of the concept of multiple-tray aerator has been developed for use in water and wastewater treatment. The concept provides a low cost treatment plant installation which produces a relatively high degree of treatment. The multiple - tray aerator, a modification of gravity aerator, effectively increases the dissolved oxygen in water body. The aeration unit of this kind is often filled with contact media such a gravels, stones, and permitted water dropping freely from tray to tray and trickling over the surfaces of the contact media present. Gravity aerator is common in water purification plants, but rare in wastewater treatment works. However, the bed of trickling filters does afford gravity gravity aeration as well as interfacial contact.

There are many types of aerators in use and under study today; Each one has its own advantages and disadvantages. However, the purpose is to optimize the time of gas transfer and also to minimize expenditure of energy. Relative to the amount of water treated and the length of its exposure, tray aerators is a combined diffused and mechanical aerators.



Development of Tray Aerator

In this study the type of tray aerator differs from other procedures which have been developed before and, in addition, gravel of size ranging from 1-3 in. is also used as packing media in tray aerator and the rate of oxygen transfer in water is considered as a parameter to be evaluated.

The principle theory of this system is based on the fact that when the liquid is discharged from an elevated dosing tank and distributed from top to bottom through each packing gravel. Oxygen is transferred to it and the concentration rises to near the saturation value. The deficiency is made up by the molecular oxygen from the atmosphere which rapidly transfers to the liquid surface and substantially mixed in the body of liquid by diffusion and convection.

Objective & Scope of Study

The effect of oxygen transfer in tap water by a specific aerator is studied. The purposes of the present investigation are as follows:

1. To study the way to draw and drive oxygen from the atmosphere and to put it in contact with the liquid flow,
2. To determine the tray spacing which gives the optimum gas transfer,
3. To select the appropriate number of trays,
4. To make a comparative study on the capability of overall oxygen transfer in tap water at specified operating conditions, and
5. To determine the required power consumption.

A comparative study of the effect of oxygen transfer in tap water using a specific aerator is made. In this experiment, the flow rate, tray spacing and capacity of tap water are used as parameters. Overall oxygen transfer rate constants are determined under nonsteady state condition. A pilot oxidation ditch is used as the experimental model.