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Rapid growth of industrialization all over the World resulted in pollution of water resources. With the increased environmental awareness, and the stricter implementation of the effluent standards being imposed by the regulatory authorities, treatment of wastewater has become a challenging task. The major requirements of wastewater treatment technology are acceptable effluent quality attainable within short hydraulic retention time, low operational cost, the capability to sustain shock loads, and simplicity of the operation and maintenance.

The biological wastewater treatment offers one of the major steps in removing the biodegradable organic pollutants present in many industrial wastewaters. Two major alternatives in biological treatment are aerobic and anaerobic wastewater treatment processes. The aerobic mode of wastewater treatment was favoured in the past, as this was considered to be reliable, stable and was meeting the requirements mentioned above.

In the recent times, power costs have been increasing dramatically, there by increasing the costs of operating an aerobic treatment system. Large amount of power is required to operate aerobic systems for aeration and mixing. Conversely, the power requirement for anaerobic processes is relatively low. In addition, valuable bye product such as methane gas can be recovered in anaerobic mode of treatment. This in certain cases can considerably reduce the cost of treatment.

The sludge production in anaerobic process is much less than that in the aerobic processes. Aerobic process metabolizes up to 40 % of the Biochemical Oxygen Demand (BOD) in to sludge, whereas, in anaerobic process approximately 5 to 10 % of BOD metabolizes to produce sludge. Due to large quantity of sludge generated in aerobic processes, disposing of the sludge has become more difficult and expensive. In view of these advantages offered by the anaerobic treatment processes, currently more attention has been received to the development of anaerobic treatment process in search of appropriate wastewater treatment technology.

The technological advances in anaerobic processes in last two decades have significantly reduced the historical weaknesses of these processes. Previously, the anaerobic treatment was not favoured for wastewater treatment, particularly for medium and low strength wastewater, because of large hydraulic retention time required. Young and McCarty's work in the year 1969 on application of anaerobic processes for the treatment of industrial and municipal wastewater has generated significant advancement in the last two decades. Today, the anaerobic treatment processes have emerged as an appropriate technology for many industrial as well as domestic wastewater treatment.

One of the most serious problems in the use of anaerobic treatment for low strength wastes, being the retention of a sufficient quantity of viable sludge under short hydraulic retention time (less than a day) now appears to have been overcome as a result of the development of the high-rate anaerobic processes *e.g.*, anaerobic filters, anaerobic expanded / fluidized bed reactor, and Upflow Anaerobic Sludge Blanket (UASB) reactor. One common feature offered by all the high-rate processes is the ability to achieve high solids retention time, even at short hydraulic retention time.

In anaerobic filters and expanded / fluidized beds, this is accomplished by the development of biofilms on support surfaces.

In UASB reactor, high solid maintenance is accomplished by the development of sludge granules or spherical sludge flocks that have extremely good settling properties. In this process, existence of high concentration of sludge granules in the sludge bed, could function as filtering medium, when wastewater is pumped in an upflow direction through an expanded sludge bed [Frostell, 1981]. Hence, no media is required in UASB reactor for biofilm attachment. Among the other high-rate processes, UASB process is one of the most popular alternatives used in a wide range of industrial as well as domestic wastewater treatment.

The idea of UASB process came into being as a modified version of the contact process in which wastewater was applied in upward direction through a dense blanket of anaerobic sludge (Modified Dorr Oliver Clarigester). The efforts, to develop anaerobic treatment technology in Netherlands at the Department of Water Pollution Control of the Agricultural University in Wageningen, resulted in the development of a new anaerobic treatment process, now known as the **Upflow Anaerobic Sludge Blanket** (UASB) process. This UASB process developed by Lettinga and his coworkers in the seventies [Lettinga *et al*., 1980a,b] has received the World-wide acceptance by the virtue of its ability to successfully treat a variety of industrial as well as domestic wastewaters [Alerts *et al*., 1993].

With the growing interest in application of this process for different wastewater, considerable research was conducted in recent past to prove feasibility of this process for the wastewater treatment for domestic and industrial origin such as, beet sugar mills, cane sugar mills, breweries, distillery, dairy, food processing, paper mills, *etc*. A review highlighting the feasibility of this process for different wastewaters is provided in appendix-I [Dhabadgaonkar and Ghangrekar, 1992].