The Design and Operation of Sewage and Industrial-Waste Treatment Processes

By C. H. KHADILKAR (*Public Health Engineering Division, Institution of Engineers, Poona-4, India*)

The existing Pasveer type of oxidation ditch has been modified and moderated, and named the B.O.D. ('Biological Oxygen Demand') Moderator, at about one-fourth of the original cost. In this modified process the ditch is first filled with water and aerated by means of rotors for 20 h a day. On the next day 10% of the water is removed from the aeration channel and an equal volume of raw waste is introduced into it. It is again aerated for 20 h. This procedure is continued for 5–6 days. At the end of this period the total volume of the waste added to the channel is 50% of the total volume in the channel.

On the fifth or sixth day a floc develops in the channel. This floc is examined under the microscope to ensure sufficient development of species of *Vorticella*, *Epistylis* and *Zoogloea ramigera*. The occurrence of these organisms indicates the 'ripening' of the ditch. After the 'ripening', the ditch is commissioned for continuous operation, and purification is obtained with a detention period of only about 6 h, as against Pasveer type of oxidation ditch where 24 h is required.

The detention time in this new method is further cut by feeding the channel with activated sludge prepared in a small activated-sludge unit.

This process is more suitable for the developing countries, where cost is a major factor in installing the customary treatment plants.

Decrease of the Bacterial Content in Different Types of Oxidation Ponds

By N. M. PARHAD and N. U. RAO (*Central Public Health Engineering Research Institute, Nehru Marg, Nagpur-3, India*)

Among the various treatment processes for sewage, oxidation ponds deserve primary consideration in India because of the abundance of light and suitable temperatures, in addition to other advantages such as cheapness in construction, simplicity in operation and ease of maintenance.

Though considerable work has been done in India and elsewhere on the performance of oxidation ponds with respect to the removal of biochemical oxygen demand, very little information is available on the decrease of indicator bacteria in different types of ponds. Four oxidation ponds of different designs located at Nagpur city (India) were studied. Samples were collected and analysed for standard plate count, coliforms, *Escherichia coli*, enterococci and biological oxygen demand.

From the results it appears that the mode of operation and the length of liquid travel are very significant, in addition to the loading, detention period and other design criteria. Of the four ponds studied, the one with three cells operated in series gave the highest percentage decreases of indicator bacteria and biological oxygen demand.

Rise of pH in Oxidation Ponds

By SHIVA S. RODGI, V. V. KANABUR, G. B. DODAKUNDI and H. S. PATIL (*Department of Zoology, Karnatak University, Dharwar, India*)

Laboratory experiments were conducted by inoculating the following media with a species of *Scenedesmus*: (1) autoclaved sewage; (2) a mineral medium containing CaCl_2 , MgSO_4 , KH_2PO_4 , NaHCO_3 and micro-nutrients, namely $\text{Co}(\text{NO}_3)_2$, NiSO_4 , CuSO_4 , FeCl_3 , H_3BO_3 and $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24}$ supplemented with NH_4Cl or NaNO_2 or $\text{Ca}(\text{NO}_3)_2$; (3) this mineral medium without NaHCO_3 . The influence of temperature, algal population, alkalinity, bicarbonate, phosphate, ammonia N, nitrite N and nitrate N on pH variations in these three media was studied.

When the light-intensity was high there was a more striking increase in media (1) and (2) to pH 11.3, whereas the pH was only 9.6 in medium (3). The sterilized sewage supported more algae, about three times more than that in medium (2) and about nine times more than that in medium (3). The values for dissolved O_2 , phenolphthalein alkalinity and also the percentage decreases of bicarbonate, phosphate, ammonia N and nitrite N in medium (1) were comparable with those in the medium (2). With medium (3) the values for these items of analysis were much less than those in media (1) and (2).

These results suggest that bicarbonate appears to be a major factor influencing the pH fluctuations in the oxidation pond.

Treatment and Utilization of Wood-Hydrolysate Wastes

By G. J. MOHANRAO, P. V. R. SUBRAHMANYAM and M. V. SRINIVASAN (*Central Public Health Engineering Research Institute, Nehru Marg, Nagpur-3, India*)

An anaerobic process has been developed for the treatment and utilization of organic industrial wastes such as those from wood hydrolysis and pulp and paper mills. This anaerobic process removes 60–90% of the biodegradable organic matter. In tropical countries, as in India, with water temperatures in the range 20–30°C, anaerobic lagooning has been found