Waste water engineering

Almost eighty percent of water we use for various purposes appears as waste which justifies it as certainly a media of process changes in all human activities for sophisticated and comfortable living. The problems appear when an activity is not viewed holistically but specific to meet the purpose where there is no proactive measure on the consequences that may appear long time after upon continuing the activity. The water comes from the natural source and is not produced and hence it should, as a whole, find its way back again to nature which is the strategy of living with nature.

We have the waste water arising out of domestic and industrial activities and the waste waters arising out of commercial and institutional needs can be added to domestic waters as the activities are the same except that the same is for a huge mass. The domestic waste water is mostly organic in nature which starts its decomposition soon after it is given out to oxidize with atmospheric oxygen. The industrial waste water characteristics are specific to the process they apply and most of the industries have their own waste water treatment plant for the pollution control and they are into cleaner production activities which are giving out less waste water and recycling became a part of their activity for the resource conservation. We cannot generalize the waste water characteristics which are very dynamic and generalization adds to erratic performance as evidenced from the failure of common effluent treatment plants.

We need to know the nature of decomposition as characteristics and we need not bother about the parameters that form the waste components as total solids, dissolved solids, colloidal solids, settleable solids, colour ,odour and so on, which are complicating the process of treatment both in domestic and industrial waste waters. Most of the solids in the waste water are identified as organic and which can be felt if the conventional treatment methods are taken into consideration holistically, organic matter are decaying immediately, their original form is broken when a favorable atmospheric condition for the bacteria is available. We could see imported fruits available in the market which gets rotten

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immediately after two days when they are bought home where we do not refrigerate the same. Raw food only will lose the moisture content on long time refrigeration as their natural form is maintained thus they don't give way for bacteria to enter and decay its content, where as the cooked food easily decays for its natural form is altered and is a combination of various ingredients and water which has bacteria and though we refrigerate, the food will decompose.

Thus we find bacteria are the key element for decomposition and to keep the nutrient cycle balanced. Though we simply say this, there are wide variety pathogenic and non pathogenic bacteria which will be found in the atmosphere and which will be responsible for decomposition. The non pathogenic bacteria are lower order bacteria which will be helpful in the immediate decomposition of all organics of simple food, vegetable and plant origin and the pathogenic bacteria are higher order bacteria which will flourish only in the complex situations mostly at high temperature and are useful for the decomposition of organics of animal flesh and such non vegetarian food. Hence we could find the life style and the food habits alter the characteristics of waste water.

When the waste water from domestic use is broadly classified as sullage and soil waste which arises from fecal matter, the conservancy system treat them separately at source and the water carriage system combines both and includes storm water too to take them to the common waste water treatment plant. For the waste reaches the waste water treatment plant in closed pipes where sufficient oxygen is not available, they undergo reduction with sulphur compounds present in the organic residue which rises the temperature and kills the non pathogenic bacteria which oxidizes the organic matter to simple forms. The same adds to more of complex bacterial pathogenity which makes the waste water treatment plant futile, which gives rise to septic conditions and foul odours.

When the waste water is treated within the premises of the dwelling units, with the septic tank and soak pits, the decomposition will be much easy and immediate, and all the nutrient value will be added to the soil that the fertility of the soil will be enhanced. More over there will be ground water replenishment that sustains the ground water resource and the problems to the common

treatment plant for the waste becoming foul for the long time stagnation will be avoided. It is a proactive measure for the human force will get depleted due to the improving life standards.

The unit processes involved in waste water treatment includes screen, sedimentation, coagulation, filtration and sludge treatment which becomes the part of physical, chemical and biological treatment. When the waste water comes to biological treatment, the waste would have become septic and it would be very difficult to treat the waste by activated sludge process, trickling filters and rotating biological contactors. The treatment available for sludge treatment are all to separate moisture from the waste and disposing it to the soil which will be fine and clog the pores leading to sewage sickness, though it is preferred for cultivation for its nutrient value to grow fodder feeds.

The sludge digestion in industrial units will be easy if coagulation is by lime water and not by mixture of alum and lime powder with which the sludge volume will not be bulky. The sludge if burnt simply at high temperature reduces the entire volume to 10% whereas the temperature will add to the smoke dispersion. Carbon emission is always favorable to balance the ecosystem and need not be worried upon as global warming. The vertical dispersion of the smoke to a high altitude need to be focused to make the required flux to reduce the atmospheric concentration of any pollutants to the minimum in the atmosphere. When everything is studied holistically, there will not be problems as the holistic view is in line with the nature.

The coarse solid wastes of organic nature can be burnt and converted readily to carbon, the fine, dissolved organics will get digested as nitrogen compounds thus the carbon added to soil, and this fine dissolved organics if treated in soak pits and added to farming will not create sewage sickness, it makes the right proportion of carbon nitrogen naturally which is much more natural and simple than compost. The carbon particles will act as adsorbent and take care of toxins too which otherwise will have an entry into plants and animals by bioaccumulation. Simple life style makes all the waste handling easy.

Common waste water treatment system will not work effectively. It is against the fundamentals of waste treatment to carry the waste water in closed conduits. They can be easily handled with septic tanks, soak pits for every individual source that makes the scenario much progressive.

Threads

1. Discuss on the origin and types of activities from which the waste water arises.

2. What are the characteristics of waste water?

3. How will you justify the treatment train of the waste water from industries?

4. What are the basic treatment units you would suggest for waste water treatment?

5. How will you add advanced treatment based on the type of activity? How will you find the need of the same? What parameters you will use to decide upon the advanced treatment?

6. What difference you find between the water treatment and waste water treatment? Explain in depth with your own observations on the narration of both.

7. How will you dispose the treated water? What are the problems you find with the existing system?

8. How do you justify the individual treatment units are more efficient than common effluent treatment plants.

9. Explain in detail the operation of septic tank?

10. How do you bring in the components of a treatment train in septic tank to function as a compact unit?

11. Biological methods form the basis of treatment? Discuss

12. Discuss on the various types of bacteria and how could you relate the enzymatic reaction of grass in the bacterial population beneficial in waste treatment?

13. Altered activities lead to less volume of waste water. Discuss on this with respect to houses, colonies, complexes, institutions and hospitals.

14. Suggest a waste water treatment plant for any one of the following: houses, colonies, complexes, institutions and hospitals. Justify your choice of selection as why the particular type of wastewater is considered?

15. Waste water treatment must be at the source for biological treatment dominates the entire treatment train in deciding the efficiency. Discuss on this.

16. Low cost treatment methods are to be modified as compact units for waste water treatment for they could serve as effective methods if their disadvantages are eliminated. Discuss the same with the concepts of each type of low cost waste water treatment. Why not they be called effective waste water treatment then.

17. Study the waste water treatment plant of your institution and discuss on the same with your observation.

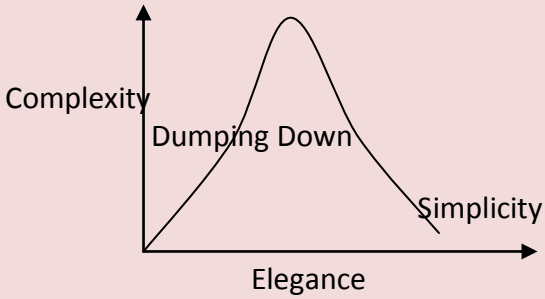
18. Sludge volume can be reduced by modified activities. Use of lime, in regular activities makes the treatment easy. Think over this and bring out the uses and advantages with basics.

19. Discuss on sludge treatment and disposal. How will you reduce the same by adopting measures in line with the nature?

20. Space, time, knowledge, desire and driving power decides the efficiency of any process. Discuss on this.

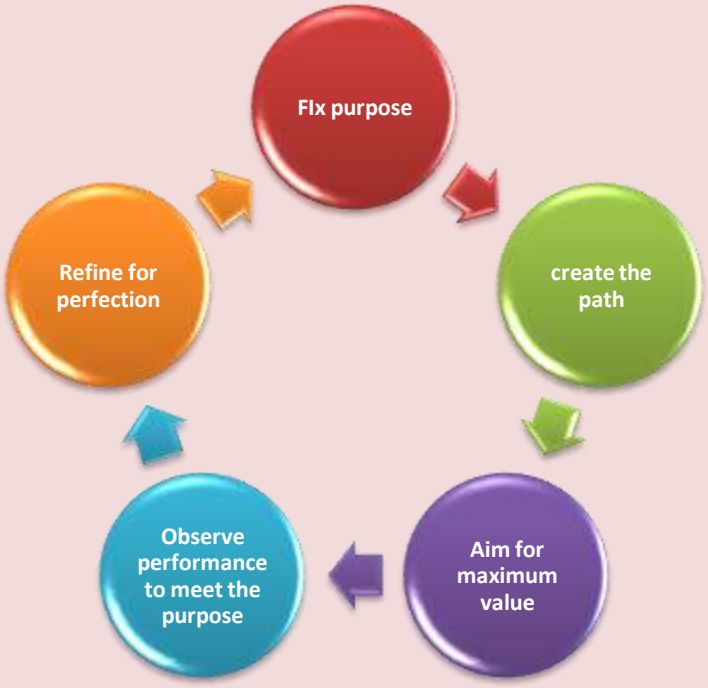
21. Elegance is unusually effective and simple which will happen with simplicity. Simplicity is awareness, knowledge, spirit of helping, honesty and sincerity, and makes every activity easy for the beneficiaries.

Find the procedure for conducting biochemical and chemical oxygen demand by getting into the purpose of same by doing the experiment. Simply add potassium permanganate in water and observe the changes. Give your conclusion.



22. Study on the oxygen sag curve, BOD curve, and the curve on elegance shown below, find a common trait of bell shaped curve with the observations.

Third dimensional view on the situation makes it progressive always. It all lies in the driving need and originality. Hence rules and norms can only be individual specific if the same need to be followed practically.



Any procedure in human life or the life of a creation meet the purpose only if it follows the above cycle, and do not repeat the earlier procedures as such. There will be welcoming changes only if the perfection is reached and

there will be stagnation if we don't realize the path defined earlier had deviated for the evolutionary changes which unavoidable and the perfection had not been checked every time. The natural selection and adaptation occurs only as a part of accommodating to the changes. These are more pronounced in animals, for they are more responsive to changes and don't stagnate.