

## ***Design, Operation and maintenance of Unit operations and processes in water and wastewater treatment and disposal***

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The water and waste water treatment efficacy depends on the volume and quality of water, waste water to be treated. The volume of water and quality depend on the volume of water needed for the purpose or activity, and the source from where the water is taken. If the source is ground water, it will be comparatively pure as the natural filtration and sedimentation happened with layers of soil. It contains mineral salts that support majority of the industrial activity. If the same is river water, the problem of treatment is cumbersome as the waste water has its entry and problems become more pronounced when the natural decomposition has not completed. Since the water cycle on its flux is favoring ground water now, all individual units can move to ground water and most industrial units can go deep layers which provide mineralized water which favors the processing in the manufacturing whereas the domestic purpose can be met with water at shallow depths. The quality of water is much better than the surface water where the surface water can meet the energy needs till the cycle shifts back to support surface waters which will take a long time to the core of decades. The concept of packed mineral water is not ethical that the same may be confined to taking water sources from sea water that will add to the mineral value and make the water use economical from other sources.

The waste water quantity and quality again depends on the life style and food pattern, industrial activities and for all these changing towards simple life style with pulling the value of any product for the comfortable and sophisticated living and exposure to global culture, traditions and heritage has given numerous combinations of living that nothing is fragmented and the connectivity imparts a better living for all. However great may be the activity involving huge masses, as hotel, commercial complexes, they can make the waste treatment to septic tank and soak pits that there is no need for common treatment system as the same makes the waste water difficult to treat for having travelled a long way during which it loses its oxidisable capacity which need to be accelerated with forced aeration thus making it expensive, unaffordable in the long run.

All the unit operations are designed as rectangular units to accommodate the quantity of water with reserve to fight the maximum demand and emergency

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needs in case of repairs and power shortage. The depth is almost fixed for the purpose of manual cleaning and to accommodate sludge and which makes the surface area for the availability of space, as the surface area is essential for settling efficiency. There is no need for coagulation in individual units as the filtration in soil stratum take care of dissolved organic solids, the disinfection and demineralization can be with activated carbon and boiling which make the water odor free and demineralised and the units must be for the family or the individual units to meet the purpose. The complexity is for we do not come out of the routine and take ways to meet the purpose. It is again in doing things differently ever to meet the purpose. All strategies can be simple and to the purpose much on the leaner side, if the target group is aimed at and the mediation do not take the show for their professionalism making the same complex and dependent. This only makes every process complex and costly as the price is fixed not for the potentials involved but for the demand and discretion of the manufacturers.

The waste water is mostly treated for the organic solids by bacterial activity and will be to the best by septic tanks which combines all treatments and finally the treated water goes back to water bearing stratum which is yielding back to ground water. We cannot purify process waste water to the original and the same makes the option towards physical chemical treatment which adds to treatment process cost exponentially which cannot be justified and are added to the cost of the product which can be minimized by adopting simple treatment methods to make the waste water used for the ground water reclamation. The same takes care of toxic chemicals, recalcitrant and organics too when treated with cess pools. They get cemented to the aggregates used therein and hence will not enter into water bearing stratum or cause nuisance to living beings by bio accumulation.

Operations of the treatment units are not fixed for an average flow which varies with time and hence the frequency and duration of operation depends on the purpose. When the treatment process is in line with the natural process, which also must be incorporated in the manufacturing process, we will be having a fairly maintenance free system. All chemicals which are manmade can be synchronized with nature and for which the processes be made progressive. The maintenance then becomes completely free for a long time which needs a holistic approach right from the beginning to make water usage optimum. Use of resources in the processes, optimum to the leaner side that the waste volume will

be much less and will add to the design period of treatment unit. When this is made we need not segregate the wastes and when the medium is made air, a solvent other than water, there will be much more saving on the treatment as we could reduce the volume simply by combustion.

Waste treatment when made for the purpose, the volume of sludge will get reduced and the same can simply be used in the manufacturing of sludge bricks used in pavers block and the heavy metals and toxic chemicals will get bonded to the sediments , remain encapsulated for a long time which also adds strength to it. The sludge in the domestic waste is completely organic and gets digested , added to the soil that the sludge management is no longer a problem but an opportunity be provided that the sludge volume will be reduced by adding lime water and not the slaked lime.

### **Thread**

1. What are the design principles of sedimentation, flocculation and filtration units?
2. Design a septic tank for an individual house to treat the waste water?
- 3, Design an Imhoff tank for a colony to treat the waste water?
4. Analyse the water of a ground water source and suggest the treatment train for the same for the assumed quality of water?
5. How will you reduce the sludge volume?How will you handle the sludge for its disposal?
6. What are the troubles that will be faced in water and waste water treatment with design, operation and maintenance?
7. Apply the holistic and lean principles to alter the conventional domestic, industrial water and waste water treatment?
8. Aesthetics is in handling the wastes effectively to get better values and not in hiding the same from the immediate vicinity, after use.

9. Water supply and drainage boards are to take a new form to inculcate do it yourself projects to promote self sustenance with a ready to use manual for rain water harvesting, ground water use and treatment, waste water treatment unit and using the organic value for fertility of the soil. Discuss on this.

10. Simply adding the entire cost to the product and making it justified adds to resources exploitation. Discuss on this.

11. When the suggestions discussed above are implemented there is no need for operation and maintenance towards waste treatment. Find out the reasons why the operation and maintenance in waste treatment is proven failure.

12. Discuss when it is to the individual concern, there is practically no need for operation and maintenance as it involves the concern of the source that there will be effective use of resources.

14. However good may be the design and how ever effective may be the functioning, the units will not be of use for the variation in the average daily volume to be handled that they don't meet the design period fully that the design cannot be taken as the mean of serving the problem. It should come for experience by a holistic view. Observation and relating the fact to many different views to construe information is the way to live. How do you correlate this with your observations on life?

15. Mindful living to the core of not wasting single paisa is economical. Living to the mindful that every paisa spent add value to experience gained to have a peaceful living. When the earlier makes one always under stress as every activity cannot have precedence and have to move on with the nature, the later offers one a life of conscience that he moves always with confidence. How do you view on this?

16. Consumerism giving confidence to anything that can be sold is not progressive. Discuss on this.

Technology should open the secrets of nature to make everything in perfect accommodation to the finest.



**Design, operation and maintenance of life are beyond the scope of an individual as he cannot design his future. Living for the present to the core of every second accumulates into a bright future which will form on its own for the efforts. Today is the tomorrow you worried for yesterday that simply live the present to make your mind relaxed. All is for good.**