

A SANITATION SYSTEM WITH PRESSURE GRADIENT: An Approach

APR Srinivas, Asst Professor, Mechanical engg, Linagaya's university, Faridabad, India.

ABSTRACT: Sanitation is defined as the use of services and facilities to dispose human excreta. However, the present day sanitation system utilises a lot of water in the disposal and this is the cause of lot of inhygiene. Poor hygiene and poor sanitation are the causes of many malnutritions among children. The paper brings in a new approach to sanitation to dispose of human excreta with minimal or without any use of water.

Keywords: Sanitation; water; cellulose; faeces.

1.0 INTRODUCTION: The current situation in the world is that 2.1 billion people lack access to safe drinking water services[1]. This situation could be indirectly improved by reduced domestic utilization of water and reduced water consumption in sewerage. The paper proposes a new method of disposing sewerage without or minimal usage of water.

2.0 LITERATURE SURVEY: The drinking water of 1.8 billion people is contaminated with faeces[1]. Fifty percent of child malnutrition is due to unsafe water, inadequate sanitation and poor hygiene[2]. The lack of safe sanitation leads to diseases like diarrhoea, soil-transmitted helminth infections, vector borne diseases and also the proliferation of culex mosquitos. Unsafe sanitation contributes to the emergence and spread of anti-microbial resistance by increasing the risk of infectious diseases[3].

3.0 METHODOLOGY: The present day sanitation involves huge quantity of water flowing into drains and this attracts huge cost to recycle and recover this water quantity. However, water could not be completely recovered as it retains the colour and smell gained from the feces. Thus, recycled water is left into crops. The nation relies on fresh water or rain water from the annual rainfall.

3.1 HYPOTEHSIS: The use of Cellulase in Pnuematic sanitation system reduces water consumption by thirty percent

Table 1: global average water consumption[4]

Consumption segment	Quantity (%)
Agriculture	70
Industry	20
Domestic use	10
Drinking	4
Basins, showers	33
Toilet flushings, leakages	30
Clothes washing	13
Floor washing	8
Outdoor	12

3.2 DISCUSSION: The present day system was once modern but with the increase in technology of pneumatics, it is almost outdated. The paper would rather suggest a new system of sanitation based on the use of pneumatics. Instead of water, let the flush send some quantity of liquid cellulase. This liquid cellulase would make a slurry of excreta and this could be sucked away by vacuum creation or pressure difference. This system would require much pressure variations across a city like delhi. This pressure difference would be on a negative gradient thereby creating very low pressures on the outskirts of a city. At the outskirts, the slurry would be dumped in the layers of mud and sand and later on would be converted into agriculture manure. The figure1 depicts a typical system of the pressure difference sanitation. However, even the cellulase needs some amount of water to make the slurry from faeces. This water is nothing but the urination during excretion and also the water used in washing the anus. The service chain of sanitation is as follows: toilet → storage/treatment → conveyance → treatment → disposal. This service chain should follow a negative slope on the pressure gradient curve, in the proposed system.

Table 2: Water consumption per flush

Parameter	Value
Water per flush[5]	7 GPF (gallons per flush)
Average Number of times a toilet is used in a day	5
Estimated gallons used per person per year[5]	12,775
cellulase needed(assume)	100grams per excreta

Cellulase enzyme price per kilogram[6]	2400 INR
Water conserved[5]	7 gpf

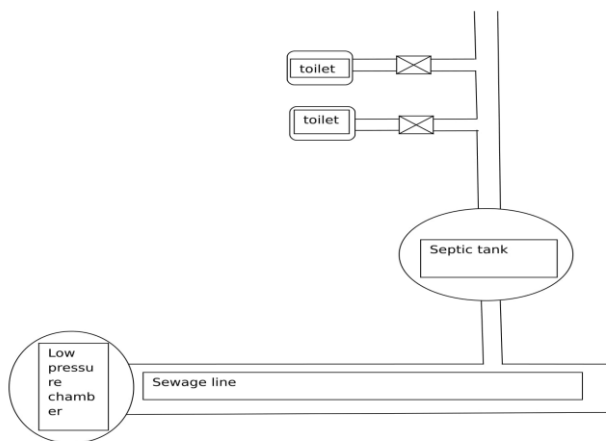


Figure 1: pressure variation sanitation system

4.0 CONCLUSION: The natural five elements are the basis of life on the planet earth. Out of these elements, water is most sought after for emanation of life from amoeba virus in sea to the much evolved human brain. This water is mostly being sent into drains because of various purposes listed out in table 1. However, the paper detailed out a preliminary work on reducing the domestic consumption of water into the drains. Use of cellulase instead of water in the flush tank of a toilet would reduce the annual consumption of water by 7 gallons per flush per person. This would also benefit the carbon footprint of a nation indirectly because of reduced recycling of water in recycling units. However, the proposed system needs an accurate control of pneumatics at every step of sanitation. The paper attempts to cleanse the natural element- WATER and also looks forward to reduce pollution of the element by thirty percent.

References:

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