Treatmeant of Waste Water from Environmentally Benign Technology

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Abstract:

Wastewater treatment broadly describes water treatment preparing water no longer needed or suitable for its most recent use for return to the water cycle with minimal environmental issues. Wastewater treatment is distinguished from water treatment by focus on disposal rather than use. Water reclamation implies avoidance of disposal by use of wastewater as a raw water supply. Treatment means removing impurities from water being treated; and some methods of treatment are applicable to both water and wastewater. Production of waste brine, however, may discourage wastewater treatment removing dissolved inorganic solids from water by methods like ion exchange, reverse osmosis, and distillation.

Keywords: Waste water treatment, Technology, Bacteria, toxic substances.

Introduction:

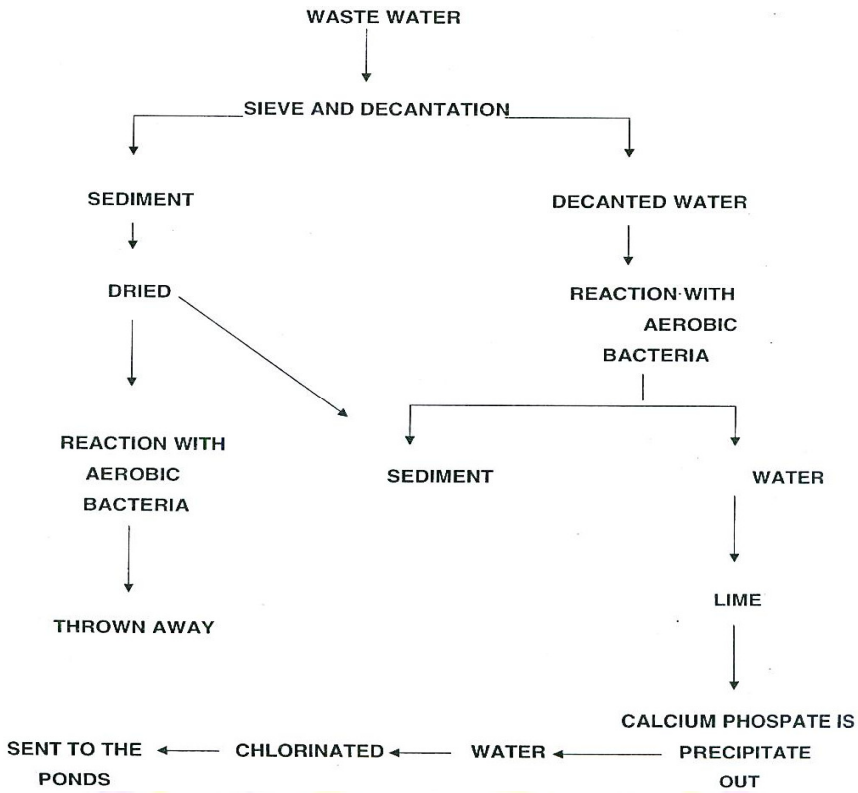
The principal objective of wastewater treatment is generally to allow human and industrial effluents to be disposed of without danger to human health or unacceptable damage to the natural environment. Irrigation with wastewater is both disposal and utilization and indeed is an effective form of wastewater disposal (as in slow-rate land treatment). The quality of treated effluent used in agriculture has a great influence on the operation and performance of the wastewater-soil-plant or aquaculture system. In the case of irrigation, the required quality of effluent will depend on the crop or crops to be irrigated, the soil conditions and the system of effluent distribution adopted. A similar approach is not feasible in aquaculture systems and more reliance will have to be placed on control through wastewater treatment.

Wastewater treatment depends on the source and nature and quantity of the substance present in it. Generally it contains toxic substances. They are of two types

a) Less toxic: If less toxic substance is present then they can be decomposed in the presence of Aerobic bacteria.

Organic waste Material (C, H, O, F, S) $+ O_2 \xrightarrow{\text{Aerobic bacteria}} CO_2 + H_2O + NO_2.$

BOD value of the water is an index for the quality of water. Generally, in polluted water it is high. The following process is commonly used for improving the quality of water. The water is first passed through Sieves and decanted. After the removal of Sediment, the decant water is subjected to Oxidation (using Aerobic bacteria) which removes all soluble Organic matter. This water is again decanted, and lime is added to precipitate out phosphates in the form of calcium phosphate. The precipitate is removed, and now the BOD value of the water comes down to 1 ppm. It is then chlorinated before releasing into the Ponds. The Sediment is dried and made to react with anaerobic bacteria (to destroy Organic matter) and thrown away.



b) More toxic: If more toxic substance is present which contain fluorides more than 1 ppm and cannot be used for drinking purpose. Fluoride exist naturally in water sources and is derived from fluorine. The concentration of fluorides upto 1 ppm in drinking water is harmless. When it exceeds 1 ppm, it cannot be used for drinking. In the districts of Nalgonda, Guntur, and Prakashm in A.P , the water contains excess of Fluorides. It reacts with Calcium Fluorides.

$Ca + F_2 \longrightarrow CAF_2$

By this reaction, the colour of the teeth turns yellow. For the same reason, the bones become weak and the disease is called "Fluorosis".

Aquatic life also gets disturbed. These more toxic substances are.nonbiodegradable. But they can be removed by i) Activated carbon method ii) Ion exchange resin method iii) Nalgonda Technique

i) ACTIVATED CARBON METHOD

This method adsorbs certain Organic substance like DOT and Endrin. In this method the fluoride ion concentration can be reduced from 5-12 ppm to 1 ppm. The water containing fluoride of high concentration is sent through waterfilters packed with activated carbon. The carbon adsorbs fluoride ions and water is freed from fluoride ions. But with use the filters get deactivated and lose their adsorption property. In such cases the filter are first washed with 4% NaOH solution and then with 1 % H3PO4 solution. The filters are again activated and can be used.

ii) ION EXCHANGE RESINS METHOD

By use of these methods certain dyes and chlorinated pesticides can be removed. Long time back defluoron-1 and defluoron-2 synthetic resins were used to remove fluoride ions. The filters are packed with resins and water is sent through them. Fluoride ions are removed by ion -exchange process. These methods are costly and require lot of skill to handle them. Hence the use of these as discontinued.

iii) NALGONDA TECHNIQUE

In 1 973, the NEERI at Nagpur introduced this method. This is a cheep method and it was introduced in Nalgonda district. This is thus called Nalgonda technique. In this method, bleaching powder, Lime and Alum are added in the same order and the water is stored and kept for some time. The fluoride ions of the water get precipitated as complex Calcium aluminum fluoride. This is filtered and pure water is

used for drinking. The' substances used in the method are harmless and are also cheap. This method is used even now.

Material and Methods:

Wastewater from Textile, pulp and paper and chemical industries was collected as grab sample and analyzed for various parameters as per standard method. The range of characteristics of wastewaterfrom textile, pulp and paper and chemical industries are present in below.

When different methods are applied to sample of waste for removal of Fluoride, data was observed (Table. 2-4).

Effect and changes:

a) Changes occurring in water due to waste water:

I. Change in the color and increase in the Salinity of water.
II. Bad odour starts emanating from rivers, ponds, and lakes.
III. Uncontrolled growth of the weeds in water.
IV. Decrease in the growth of fish.
V. Polluted water leads to contaminated diseases like Cholera, Jaundice, Typhoid and Diarrhoea,
VI. Polluted water is not used for drinking,
VII. Aquatic life gets destroyed,
VIII. The number of Tourists visiting beaches gets decreased.

b) Due to Inorganic substances:

i) Salts, trace elements like Copper, Zinc, Arsenic.. .etc.. .effects the human health and Aquatic animals.

ii) Metals and Complex compounds, disturb the water system. Algae cannot grow properly. In such surrounding, this decreases photosynthesis and in creases air pollution indirectly.

iii) Cyanides, Hydrogen Sulphides, CO_2, NO_2, and Sulphites, effect pH of the water and becomes toxic to Aquatic animals.

iv) Algae Nutrients: Nutrients like CO_2 H , O , N , Nitrates , Phospates, Sulphates and micro nutrients like Boron, Chlorine, Copper, Iron, Manganese, Vanadium and Zinc.etc.. effects Eutrophication of the pond causes excess growth of Algae and subsequently the ponds get dried up.

v) Heavy Metals like Lead and Mercury:effects water and becomes toxic.

vi) Fluorides: effects Bones and Teeth of Human beings.

Result and Discussion:

A) Effect of parameters by different method on sample of wastewater from Textile Industry:

When Fluoride is removed by different method (as shown in Table 1) on sample of waste water from Textile Industry the other parameters are also removed about

Color (73.17%) , Suspended solid (85.60%) , COD (89.75%) , BOD (95.12%) .for less Toxic substances by Aerobic method.

Color (69.44%) , Suspended solid (79.86%), COD (83.33%) , BOD (93.05%) .For more Toxic substances by Activated Carbon method.

Color (76.76%) , Suspended solid (84.44%), COD (90.07%) , BOD (95.19%) .For more Toxic substances by Ion exchange resin method.

Color (77.77%), Suspended solid (82.22%), COD (84.44%), BOD (91.11%) .For more Toxic substances by Nalgonda Technique method.

B) Effect of parameters by different method on sample of wastewater from Pulp and Paper Industry:

When Fluoride is removed by different method (as shown in Table 2) on sample of waste water from Pulp and Paper Industry the other parameters are also removed about

Color (77.36%) , Suspended solid (84.90%), COD (90.57%) , BOD (93.34%) . .for less Toxic substances by Aerobic method.

Color (91.30%) , Suspended solid (93.47%) , COD (94.34%) , BOD (95.21%) .for more Toxic substances by Activated Carbon method.

Color (80.80%) , Suspended solid (87.37%), COD (90.50%) , BOD (91.92%) .for more Toxic substances by Ion exchange resin method.

Color (77.77%) , Suspended solid (87.40%), COD (94.07%) , BOD (95.92%) .for more Toxic substances by Nalgonda Technique method..

C) Effect of parameters by different method on sample of waste water from Chemical Industry:

When Fluoride is removed by different method (as shown in Table 3) on sample of waste water from Chemical Industry the other parameters are also removed about

Color (91.87%) , Suspended solid (93.42%), COD (94.46%) , BOD (96.71 %). for less Toxic substances by Aerobic method.

Table.1-Range of Characteristics of Wastewater from Textile. Pulp and Paper and Chemical Industries

Sl.No	Parameter	Textile Industry	Pulp And Paper Industry	Chemical Industry
1	Color	2000-2050	480-540	209000-220500
2	PH	8.0-9.0	7.8-8.2	1.56-1.6
3	Alkanility	525-550	290-320	
4	Suspended solid	270-300	218-240	8190-8350
5	Dissolved solid	4180-4320	2235-2310	436980-440780
6	COD	1920-2000	750-980	139000-140600
7	BOD	408-470	210-300	19800-20780
8	Fluoride	4-10 ppm	5-1 2 ppm	10-15 ppm

*AII values are expressed in mg/L expect color and pH. .

Table.2-For Characteristics of treated effluent from Environmental Benign Technologies for treating Textile wastewater.

Sl.No	Parameter	Textile Industry	Removal Of Toxic Substances			
			Less	More		
				ACM	IERM	NT
1	Color	2050	1500	1755	1840	1950
2	pH	7.0	8.2	8.4	8.6	8.9
3	Alkality	540	500	490	510	520
4	Suspended solid	288	200	230	240	268
5	Dissolved solid	4230	3500	3700	3800	4010
6	COD	1954	1500	1650	1760	1866
7	BOD	450	350	370	380	410
8	Fluoride	5 ppm	1 .2ppm	1.1ppm	1.05ppm	1.01 ppm

Table.3-For Characteristics of treated effluent from Environmental Benign Technologies for treating Paper and Pulp waste water.

Sl.No	Parameter	Pulp And Paper	Removal Of Toxic Substances

		Industry				
			LESS	MORE		
				ACM	I ERM	NT
1	Color	530	410	450	480	495
2	pH	7.0	7.8	8.0	8.2	8.4
3	Alkality	305	250	270	290	297
4	Suspended solid	230	210	215	.217	219
5	Dissolved solid	2210	1800	1950	2010	2120
6	COD	990	800	865	896	910
7	BOD	270	210	236	254	259
8	Fluoride	8ppm	1 .4ppm	1 .3ppm	1.2ppm	1.1 ppm

Table.4-For Characteristics of treated effluent from Environmental Benign Technologies for treating Chemical Industries waste water.

Sl.No	Parameter	Chemical Industry	Removal Of Toxic Substances			
			LESS	MORE		
				ACM	IERM	NT
1	Color	212900	195600	198900	201100	205900
2	PH	7.0	7.8	7.9	8.1	8.3
3	Alkality	240	190	198	210	220
4	Suspended solid	760	7100	7300	7330	7410
5	Dissolved solid	443000	402500	413560	425000	436500
6	COD	137800	126500	128600	129900	132000
7	BOD	19650	18500	18900	19100	19300
8	Fluoride	lOppm	1 .3ppm	1.25ppm	1.20ppm	l.lOppm

Conclusion:

Through Industry is throwing lot of "Unwanted substances" into the environment, it is not possible to stop Industrialization. Sustainable development must continue without causing any harm to it. In this connection, the progress made in biotechnology is very helpful. Micro Organism and enzymes can be used for the degradation of much waste substance in Wastewater. These are called "Bioremedies". Bioremedies methods are cheaper and "Eco-friendly" than the classical physico-chemical methods.

Generally, in a reaction, Bye products are formed. Many times, these Bye products become the pollutants. Research must be carried in such a manner that there will not be any Bye product in the reaction.

A + B ⟶ C + D

C: Product (wanted substance)

D: Bye product (unwanted substance)

A + B ⟶ C

No Bye product (Environment friendly reaction).

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