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Review Article

A review article on assessment of water quality parameters

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ABSTRACT

Disposal of industrial as well as domestic effluents become in water resources is becoming a serious concern from last few decades. Hence various techniques were developed for purification of water. Pollution of water streams causes due to by different inorganic, organic and biological contaminates, among which pesticides are very common and introduced due to agriculture source, represents a serious environmental problem. Several usual methods of water treatment exist such as activated carbon adsorption, chemical oxidation, biological treatment, etc. and as such have found certain practical applications. For example, activated carbon adsorption involves phase transfer of pollutants without decomposition into another pollution problem. Chemical oxidation mineralizes all organic substances and is only economically suitable for the removal of pollutants at high concentrations.

1. Introduction

Water pollution is becoming a serious problem day by day. Therefore, many processes have been proposed over the years and are currently being employed for waste water treatment.[1,2] Wastewater treatment is a process used to remove contaminants from wastewater and convert it into an effluent that can be returned to the water cycle. Once returned to the water cycle, the effluent creates an acceptable impact on the environment or is reused for various purposes. This paper presents a review of the various methods and treatments used for water and waste water treatment in order to remove the various constituents of the pollution cycle: solids, organic carbon, nutrients, inorganic salts and metals, pathogens.[3,4]

Waste-water generally contains high levels of organic material, numerous pathogenic microorganisms, as well as nutrients and toxic compounds. It thus entails environmental and health hazards and, consequently, must immediately be conveyed away from its generation sources and treated appropriately before final disposal. The ultimate goal of waste-water management is the protection of the environment in a manner commensurate with public health and socio-economic concerns. Fundamental studies in the fields of chemistry and microbiology and findings from research into process techniques provide the foundations on which new methodologies for planning and laying out wastewater treatment systems are currently built. In the earth's crust only 0.01% of total water exists as surface fresh water. Thus, fresh water contaminated by inorganic and organic substances such as dissolved solids, metals, detergents, pesticides, Fertilizers, industrial toxic effluents, domestic & agricultural waste etc. At several places on earth there is scarcity of ground water.[5,6] The quality of water in an aquatic environment depends on the physical, chemical & biological interactions of environment surrounding it.[7]

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Pesticides present in nearby farms & chemical effluents given out by industries largely affect growth of micro-organisms. Degradation of organic matter in the presence of bacteria leads to depletion in level of oxygen. Large amount of calcium & magnesium present in water makes the water hard & there by destroying its portability & use for domestic purpose. Chemical oxygen demand (COD) is a measure of organic compounds & other oxidizable elements present in water. This is directly related to aesthetic quality of water. The minerals and impurities are normally present in very small concentrations are measured either as parts per million (ppm) (how many parts of impurities in a million parts of water) or milligrams per liter (mg/l). The terms are equivalent at low concentrations and are used interchangeably in the water and wastewater. Some parameters are measured in parts per billion (ppb) or micrograms per liter (μg/l). These terms are also essentially equivalent at low concentrations. The case studies outline the current status of our country with respect to its waste-water treatment efforts and look at its future plans for the development of waste-water treatment facilities. [8]

2. Parameters of Water Quality

2.1. There are three types of water quality parameters:

1. (a) Physical parameters: i) Temperature ii) Turbidity iii) Color
   (b) Chemical parameters: i) pH ii) Hardness iii) Dissolved Solids iv) Organic Characteristic
   (c) Biological parameters: i) Algae ii) Bacteria iii) Protozoan iv) Viruses

They are summarized in Table 1.

Table 1: Parameters of water quality

S. No	Types of water quality parameters		
1	**Physical parameters**	**Chemical parameters**	**Biological parameters**
2	Turbidity	pH	Turbidity Bacteria
3	Temperature	Acidity	Algae
4	Color	Alkalinity	Viruses
5	Taste and odor	Chloride	Protozoa
6	Solids Chlorine residual	Chlorine residual	
7	Electrical conductivity (EC)	Sulfate	
8		Nitrogen	
9		Fluoride	
10		Iron and manganese	
11		Copper and zinc	
12		Hardness	
13		Dissolved oxygen	

2.2. Water quality standards

Standards of different category of water have been prescribed by different health agencies (Lester, 1969). Some of such types of agencies are U.S. Public Health Service Drinking Water Standards (USPHS) (1962), Indian Council of Medical Research (ICMR) (1962), World Health Organization (1992) etc. Standards are essential because the quality of water directly affects the human health. Water quality standards prescribed for inland water by different agencies has been given in Table 2.

Table 2: Water quality standards for inland waters

Parameter	USPHS	BIS	WHO	ICMR
Temperature ^{0}C	-	40.0	-	-
EC Sm^{-1}	0.03	0.075	-	-
pH	6.0-8.5	6.5-8.5	7.0-8.5	6.5-9.2
DO mg L^{-1}	>4.0	>5.0	-	-
BOD mg L^{-1}	-	<3.0	-	-
COD mg L^{-1}	-	<20.0	-	-
Chloride mg L^{-1}	250	250	200	250
Alkalinity mg L^{-1} $CaCo_3$	-	-	-	81-120
Nitrate mg L^{-1}	10.0	50.0	45.0	20.0
Phosphate mg L^{-1}	0.1	-	-	-
Sulphate mg L^{-1}	250	150	200	200
Total hardness mg L^{-1} $CaCo_3$	500	300	100	300
Total solids mg L^{-1}	500	-	500	-
Calcium mg L^{-1}	100	75	75	75
Magnesium mg L^{-1}	-	30	-	50
Potassium mg L^{-1}	-	-	-	20
Sodium mg L^{-1}	-	-	50	-

3. Pollution Control in India

In 1992, the CPCB has launched a water pollution control agenda in order to tackle the problem of industrial pollution. It has identified 1551 large and medium industries, and given a time schedule for compliance with the prescribed standards. The progress report is presented in the table III and IV. According to these figures, a drastic reduction can be observed in the number of non-compliant industries. Doubts may remain, however, concerning the actual operation of the installed treatment units. There is indeed evidence that many industries only run their effluent treatment plant (ETP) during the inspections. [9]

4. Methods for Waste Water Treatment

The various methods are available for the treatment of hazardous waste.

4.1. Physical method

Physical treatment process includes gravity separation, phase change system such as Air steam stripping of volatile from liquid waste, adsorption, reverse osmosis, ion exchange, electro dialysis.

4.2. Chemical method

Chemical methods usually aimed at transforming the hazardous waste into less hazardous substances using techniques such as P^H neutralization, oxidation or reduction and precipitation.

4.3. Biological methods

Biological treatment method used microorganisms to degrade organic pollutant in the waste stream.

4.4. Thermal methods

Thermal destruction process that are commonly used include incineration and pyrolysis incineration is becoming more preferred option in pyrolysis the waste material is heated in the absence of oxygen to bring about chemical decomposition.

Fixation /immobilization/stabilization techniques involved the dewatering the waste and solidifying the remaining material by mixing it with stabilizing agent such as Portland cement or pozzolanic material, or vitrifying it to create a glassy substance. For hazardous inorganic sledges, solidification process is used. [10]

Recharging methods can be applied to both superficial and deep waters; natural water can be used as well as purified wastewater provided that all the necessary precautions have been taken and thorough checks carried out. If purified wastewater is used, the refining process should focus mainly on the removal of suspended solids, the destruction of toxic solutes and on the microbiological load. The type of tertiary treatment necessary will depend not only on the quality of the purified sewage and the selected feeding system, but also on the quality of the ground and of the aquifer and hence on the system 'capacity for natural purification, especially where organic and inorganic micro-organisms and dissolved solids are concerned.

Filtration operated in ground consisting of a mixture of sand and gravel with clay deposits in the first layer, and diffusion is used to reach deeper layers of extremely low permeability. [11]

5. Conclusion

Extensive research activity in this field has led to significant improvement and diversification in the processes and methods used for waste-water treatment and sludge management. It is generally recognized that the main economic burden associated with water pollution is the effect of pollution on health alternative methods can be used to further treat or distribute the treated effluent. Due to continuous increase in its demands, rapid increase in population and expanding economy of the country we need some advanced well equipped and low cost and easily generable techniques. Above technique is useful for all wastewater and natural water to remove pollutants and impurities from water and reuse this wastewater to reduce stress of economy on country and it also affect the environment and indirectly it helpful to reduce water pollution.

6. Source of Funding

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7. Conflict of Interest

None.

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