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Methods for Water and Waste Water Treatment and Management

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ABSTRACT
Waste water is water whose physical, chemical or biological properties have been changed as a result of the introduction of certain substances which render if unsafe for some purposes such as drinking. The day to day activities of man is mainly water dependent and therefore, discharge waste into water. This article highlights methods of waste water treatment system and management for toxic wastes.
Keywords- Waste Water, Treatment, Toxic Wastes, Management.

I. INTRODUCTION

Satisfactory disposal of wastewater is dependent on its treatment prior to disposal equate treatment is necessary to prevent contamination of receiving waters to a degree which might interfere with their best or intended use, whether it be for water supply, recreation, any other required purpose.

Wastewater treatment consists of applying known technology to improve or upgrade the quality of a wastewater. Usually wastewater treatment will involve collecting the wastewater in central, segregated location (the Wastewater Treatment Plant) and subjecting the wastewater various treatment processes.

Its objective is to produce an environmentally-safe fluid waste stream (or treated effluent) and a solid waste for treated sludge) suitable for disposal or reuse (usually as farm fertilizer). Using advanced technology it is now possible to re-use sewage effluent for drinking water.

In the Indian context, conventional sewage treatment plants fall into systemic disrepair die to (1) high operating costs, (2) equipment corrosion (due to formation of methane and hydrogen sulphide, (3) non-reusability of treated water due to high COD and high fecal coliform counts, (4) lack of skilled operating personnel and, (5) equipment replacement issues. Examples of such systemic failures include the massive cleanup effort by the Indian government in 1936 by setting up sewage treatment plants under the Ganga Action Plan

Wastewater treatment, however, can also be organized or categorized by the nature of the treatment process operation being used, for example, physical, chemical or biological.

Water and Waste Water Treatment System

1- Physical Method

Sedimentation (Clarification), Screening, Aeration. Filtration, Flotation and Skimming Degasification, and Equalization are physical methods.

Physical methods include processes where no gross chemical or biological changes are carried out and strictly physical phenomena are used to improve or treat the waste water. Examples would be 'coarse screening' to remove larger objects and sedimentation (or clarification). In the process of sedimentation, physical phenomena relating to the settling of solids by gravity are allowed to operate. Usually this consists of simply holding a wastewater for a short period of time in a tank under dormant conditions, allowing the heavier solids to settle, and removing the clarified effluent. Another physical treatment process consists of that is physically adding air, usually to provide oxygen to the wastewater. Still other physical phenomena used in treatment consist of filtration. Here, wastewater is passed through a filter medium to separate solids. An example would be the use of sand filters to further remove entrained solids from a treated wastewater Permitting greases or oils, for example, to float to the surface and skimming or physically removing them from the wastewaters is often carried out as part of the treatment process.

In certain industrial wastewater treatment processes strong or undesirable wastes are sometimes produced over short periods of time. Since such "slugs" or periodic inputs of such wastes would damage a biological treatment process, these wastes are sometimes held, mixed with other wastewaters, and gradually released, thus eliminating "shocks" to the treatment plant. This is called equalization. Another type of "equalization" can be used to even out wide variations in flow rates. For example, the wet well of a pump station can receive widely varying amounts of wastewater and, in turn, pump the wastes onward at more uniform rates.

2- Chemical Method

Chlorination, Ozonation, Neutralization, Coagulation, Adsorption, and Ion Exchange are examples of chemical methods Chemical treatment consists of using some chemical reaction or reactions to improve the water quality. The most commonly used chemical process is chlorination. Chlorine, a strong oxidizing chemical, is used to kill bacteria and to slow down the rate of decomposition of the wastewater. Another strong oxidizing agent that has also been used as an oxidizing disinfectant is ozone.

A chemical process commonly used in many industrial wastewater treatment operations is neutralization. Neutralization consists of the addition of acid or base to adjust pH levels back to neutrality. Since lime is a base it is sometimes used in the neutralization of acid wastes.

Coagulation consists of the addition of a chemical that, through a chemical reaction, fumes an insoluble end product that serves to remove substances from the wastewater. Polyvalent metals are commonly used as coagulating chemicals in wastewater treatment and typical coagulants would include lime (that can also be used in neutralization) certain iron containing compounds (such as ferric chloride or ferric sulphate) and alum.

3- Biological Method

Biological treatment methods use microorganisms, mostly bacteria, in the biochemical decomposition of wastewaters to stable end products. More microorganisms, or sludge are formed and a portion of the waste is converted to carbon dioxide, water and other end products. Generally, biological treatment methods can be divided into aerobic and anaerobic methods. Based on availability of dissolved oxygen.

Aerobic methods include Activated Sludge Treatment Methods, Trickling, Foltres, Oxidation Ponds, Lagoons etc. Here oxidation of the organic matter takes place.

Anaerobic methods include Anaerobic Digestion, Septic Tanks, and Lagoons where, mostly reduction of carbon in organic compounds into hydrocarbons takes place.

The solids which are removed are primarily organic but may also include inorganic solids. Treatment must also be provided for the solids and liquids which are removed as sludge. Finally, treatment to control odours, to retard biological activity or to destroy pathogenic organisms may also be needed.

Wastewater may contain high levels of the nitrous nitrogen and phosphorus Excessive release to the environment can lead to a build up of nutrients, called eutrophication, which can in turn encourage the overgrowth of weeds algae, and cyanobacteria (blue-green algae). This may cause an algal bloom, a rapid growth in the population of algae. The algae numbers are unsustainable and eventually most of them die. The decomposition of the algae by bacteria uses up so much of oxygen in the water that most or all the animals die, which creates more organic matter for the bacteria to decompose. In addition to causing a deoxygenating condition, some algal species produce toxins that contaminate drinking water supplies. Different treatment processes are required to remove nitrogen and phosphorus.

Methods of Management for Hazardous and Toxic Wastes

A hazardous waste is any discarded material, liquid or solid, that contains substances known to be:

1. Fatal to humans or lab animals in low doses,
2. Toxic, carcinogenic, mutagenic or teratogenic (an agent that interrupts or alters the normal development of a foetus with results that are evident at birth, e.g., a chemical, virus, or ionizing radiation) to humans or other life-forms;
3. Ignitable with a flash point (The flash point of a volatile liquid is the lowest temperature at which it can vaporize to form an ignitable mixture in air) less than 60°C. Ignitable wastes can create fires, and are spontaneously combustible. Examples include waste oils and used solvents.
4. Corrosive. Corrosive wastes are acids or bases (pH less than or equal to 2 or greater than or equal to 12.5) that are capable of corroding metal containers such as storage tanks, drums, and barrels. Battery acid is an example.
5. Explosive or highly reactive. Reactive wastes are unstable under "normal" conditions. They can cause explosions, toxic fumes, gases, or vapors when heated, compressed, or mixed with water. Examples include lithium-sulphur batteries and other explosives.

A hazardous waste is a waste that poser substantial or potential threats to public health or the environment.

These wastes may be found in different physical states such as gaseous, liquids, or solids. Furthermore, a hazardous waste is a special type of waste became it cannot be disposed off by common meats to other by-products of our everyday lives.

Many types of business generate hazardous waste. For example, dry cleaners, automobile repair shops, hospitals (approximately 0.5% of all hazardous wastes produced are of biomedical origin) and photo processing centers generate hazardous waste. The producers of hazardous wastes are companies such as chemical manufacturers, electroplating companies, and oil refineries.

Hazardous waste also include sludge leftover from electroplating processes, certain waste from iron and steel manufacturing, wastes from cleaning and/or degreasing processes, solvents, wastes from industries such as petroleum refining or pesticide manufacturing. Some of the most common hazardous wastes include fluorescent light bulbs, some old batteries (lithium or lead containing batteries), cathode ray tubes, and mercury-containing devices, discarded paint, pesticides, cleaners and a number of other household products.

Earlier, hazardous wastes were being disposed in regular landfills resulting in unfavorable amounts of hazardous materials seeping into the ground. These chemicals eventually made their way to the water systems, and contaminated the soil that are used by animals and crops, as well as the soil that people employed to build their communities. Currently, in order to enter a landfill, hazardous wastes must be

stabilized and solidified, rendering them less harmful than they were in their original forms.

- Hazardous and toxic wastes, when released into the environment, cause many health problems including cancer and birth defects.
- Disposal practices for hazardous wastes have often been unsatisfactory Government legislation and alternative disposal practices are creating safer and more effective ways of dealing with this increasingly serious problem.

Hazardous Waste Disposal

Treatments can be classified as physical chemical biological or thermal Physical treatments are used to separate solids from liquids through the use of physical forces and mechanical devices. Chemical treatments are used to neutralize (e.g., by mixing acids and bases), precipitate, oxidize or reduce chemical components, or to cause a chemical alteration of a liquid phase to produce a solid, vapor or altered liquid phase. Biological treatments are used to biodegrade diluted organic wastes, while thermal treatments are used to cause the vaporization, oxidation or other destruction of liquid or solid phase components. The important techniques of hazardous waste management are:

- ***Avoid production of Hazardous waste:*** The safest and least expensive wayto avoid hazardous waste problems is to avoid creating the wastes in the first place.
- ***Reusing and Recycling to nonhazardous forms:*** Most hazardous waste is recycled, converted to nonhazardous forms, stored, or disposed off so that it doesn't become a public problem. However, the hazardous waste that does enter the environment is one of our most serious environmental problems.
- ***Converting to non hazardous forms:*** Several processes is also available to make hazardous substances less toxic. Chemical processing can transform materials to nontoxic forms. A simple example is Neutralization. A corrosive acid that is neutralized with a basic substance so that it is no longer corrosive.
- ***Incineration destruction and waste-to-energy:*** A hazardous waste may be "destroyed" for example by incinerating it at a high temperature. Flammable wastes can sometimes be burned as energy sources; incineration treatments not only reduce the amount of hazardous waste, but also they also generate energy. Controlling the amount of oxygen allowed is significant to reduce the amount of harmful by-products formed.
- ***Pyrolysis:*** Some hazardous waste types may be eliminated using pyrolysis in an ultra high temperature electrical arc, in inert conditions to avoid combustion. Examples are the destruction of concentrated organic wastes like pesticides and other persistent organic pollutants.

The best way is to avoid many problems by reducing our output of hazardous waste in the first place; reduction of all hazardous wastes could be achieved by the use of more efficient manufacturing processes, use of alternative compounds and the re-use as is or the reprocessing.

Another concerns about hazardous waste is the danger of accident or leakage during transportation, storage of large quantities awaiting disposal; and where to locate the hazardous waste treatment facility, a facility that no municipality or township wants.

Conclusion

Waste water is and will always be with us. because we cannot survive without water, when water supplied is used for the numerous human activities, it become contaminated its or characteristic is changed and therefore become waste water. In most developing countries. low cost, low technology methods such as waste Stabilization bonds have been successful.

II. REFERENCES

[1]. Adu-A.M.; Anku R.E. Small scale waste water Treatment in Ghana (a Seenerio). Retrieved (2010), 1-6.
[2]. Awuah. E.; Amankwaa K.R., Characterisation of waste water its sources and its environmental Effects' (2002) I- Learning seminar on Urban waste water Management.
[3]. Economics and Social commission for Western Asia, Waste Water Treatment Technologies A General review (2003), United Nation Publication.
[4]. Kamala A., Kanth R.D.L., Environmental Engineering Tata MacGraw-Hill (1989) Publishing 121-128.
[5]. Tare V. Nema A.; VSAB Technology Expectations. and Reality (2010) Retrieved.
[6]. Schultz T.E. Biotreating process wastewater: Airing the options, (2005) Chemical Engineering.
[7]. National Academy, water conservation Reuse and Recycling, Proceedings of an Iranian-American Workshop National Academy Press (2005) Washington.
[8]. Hendy, S.M.H., Waste water Management and Reuse in Agriculture Amman, Jordan (2006).
[9]. Gopinath, A.; Chandradasan Environmental Chemistry (2015), Vishal Publishing Co., Jalandhar pp- 167.
[10]. S.S. Dara, A Textbook of Environmental Chemistry and pollution control; S.Chand and Company Ltd.
[11]. Pramod Singh, Environment Pollution Management.
[12]. khitoliya R.K., Environmental Pollution-Management and Control for sustainable development, S.Chand and Company Ltd.
[13]. V.K. Ahluwalia, Environmental Chemistry, Ane Books Pvt. Ltd., New Delhi
[14]. A.K. De, Environmental Chemistry, New Age International Ltd.

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