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Design of Eco-Friendly Wastewater Treatment System for Water Supply

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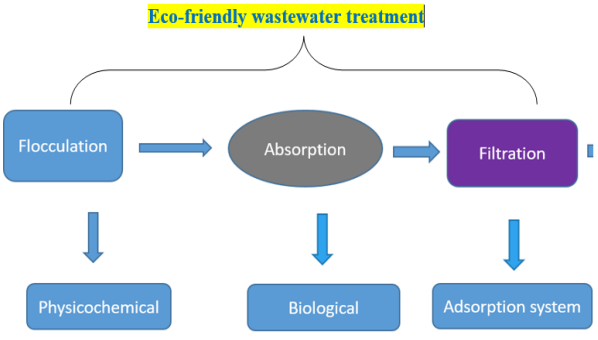
***Abstract*—** Water is very important for our environment to survive life's cycle. During this life cycle, a human being always uses those water resources for many reasons such as mainly consist of bathroom, laundry, the kitchen of many houses, offices, and hotel usage. And many industries and factories also use water resources for their necessary loading systems. Where else, there are not only human beings but also many animals, plants also use water resources for their life cycle system to alive. If we have a lack of water resources, we will die or get the biggest problems in our natural nature, environments. So that why, we need technologies and policies to control not only water resources but also other natural resources in our environment. There is wastewater come mainly from domestic and industries. These water can call greywater and backwater respectively. Blackwater comes from urine and feces. Greywater comes from daily water used by humans such as the bathroom, laundry, kitchen of many houses hold usage. In this paper is mainly focus on solving those systems, design with Eco- friendly wastewater treatment, and combination with the Advance process for a Greywater system. These designs can also be used for treating water from lakes and rivers for not only the urban area and also the rural area. These systems or design is a combination of Chemical, Biological, and physical for wastewater treatment

***Keywords*—** *AC- Activated Carbon, WHO- World Health Organization, MLD- millions of liter per day, IRWR- internal renewable water resources, RO water -reverse osmosis water, CUSSP- Coastal and Urban Settlement Support Program, Absorption Process, Adsorption Process, Zeolite, Silica Sand, Water Hyacinth Plants, Wind fan loading shear mechanine, Flocculation, Coagulation, Sedimentation, Eco-friendly Design.*

I. INTRODUCTION

Myanmar's Union is located in South East Asia and there is a distance of 2200 km from north to south and 950 km from east to west as well. Myanmar is a land that has many water resources. The catchment of the ten main river basins in Myanmar contains approximately 737800 km2. The potential volume of water resources is approximately 1082 km3 for surface water, and 495 cubic km for groundwater respectively. As Myanmar's agro-based region, water utilization for the agricultural sector stands at 90 percent, while industry and domestic usage allow for only about 10 percent of total water utilization. [1] The total utilization of the water supply of the country is just around 5 percent of the energy. Currently, 82.3% of the people in Myanmar are using an increased drinking water supply, 93.2% in urban areas, and 77.6% in rural areas. The population's drinking-water supply depends through states and divisions in Myanmar. [9]. These water can call greywater and backwater respectively. Blackwater comes from urine and feces. Greywater comes from daily water used by human such as the bathroom, laundry, kitchen of many houses hold usage. I think that those greywaters are very important and need to treat for use in my country, Myanmar. [2]. Myanmar has many wastewater plants, but most of these are not from the greywater system. Most of them are treat water for sewage and river, lake water collected reservoir treat methods. So that why, I am thinking about solving those systems, design with Eco-friendly wastewater treatment, and combination with the Advance process for a Greywater system. But, I think these designs can also be used for treating water from lakes and rivers for not only the urban area and also the rural area. These systems or design is a combination of Chemical, Biological, and physical for wastewater treatment. And also, we are environmental engineers now, so that why we need to consider how to affect the cost of our plans. There are very important four power methods to success for any plans or plants which are base on Money power, Machine power, Man Power, and Management Power. These are also can call four powers or Four- M process. According to these reasons, [3] have been thinking about my process to become with effecting cost, less maintenance, and survive easily to process, using materials can find easily our surroundings and ecofriendly with our environment.

II. OVERVIEW DESIGN FOR ECO-FRIENDLY WASTEWATER TREATMENT



Overview design for eco-friendly wastewater treatment

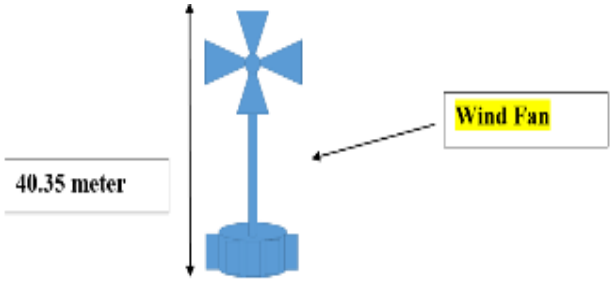
III. DESIGN EXPRESSION AND ANALYSIS

A. *Flocculation System*

Groundwater, surface water and whatever greywater or backwater contains both dissolved and suspended material. Coagulation and flocculation are used to remove the suspended solids from the water. Flocculation, a gentle blending step, increases the particle size from submicroscopic micro floc to recognizable suspended particles. Micro floc particles collide, allowing them to bind to create larger visible flocs called pin flocs. [4] Floc size tends to build up with further collisions and reactions with added inorganic polymers (coagulants) or organic polymers. These macro flocs are formed and high molecular weight polymers, called coagulant assists which can be applied to help attach, bind, and stabilize floc, and also adding weight, and increase the rate of settlement. When the floc has reached its optimum size and strength, the water is ready for sedimentation for settlement.[5]

B. *Design for Flocculation System*

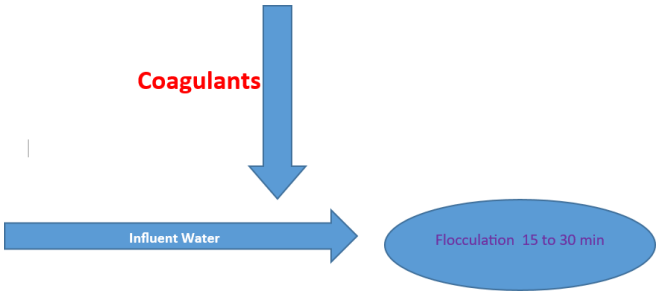
Design contact times for flocculation ranges from 15 to 20 minutes to an hour more than, and flocculation needs good attention to the mixing velocity and the amount of mixing energy. To order to protect floc from breaking apart or shearing, the mixing velocity and energy are typically decreased as the size of floc increases. When the flocs have been broken down, it is difficult to get them to return to their ideal size and strength. The number of operator controls required for flocculation is highly dependent on the type and design of the equipment. Most of the energy such as electric range is also used for loading shear to these flocculation basins. According to these above processes and reasons, make a design for convenient to control and reduce electricity use and cost in that flocculation system [6]. So, Firstly, these considered reducing electricity energy and cost for my design of the flocculation basin. So that why, for using instead of electricity for loading shear, choose wind fan loading shear for mixing influence wastewater in the flocculation basin to settle for suspended solids. When the wind is rubbing to fan and that can lead to load shear gear for mixing influence wastewater in the flocculation basin. [7]



Design for Flocculation System

C. *Process for Flocculation System*

Before influence wastewater reaches to flocculation basin, there are coagulation chemical adding systems are need the water to bring the unsettling particles together into larger, heavier masses of solids. Coagulation chemical adding is a breakdown of the colloid by altering the pH or the concentrations in the solution. For those chemical materials for coagulation adding to wastewater, to choice Alum to add for this system. That is because, it's cheap, generally easily obtainable, and easy to use if we turn it properly. [8] Alum needs hydroxide and alkalinity and works in a certain pH range. Large quantities are also needed. There are the dirtier the water, the more alum we need to feed. Once we feed a certain amount of alum, it stops working. Aluminum Sulfate, widely known as Alum, reacts with bicarbonate alkalinities found in water when applied to treated wastewater and forms a gelatinous precipitate. Alum causes insoluble materials in water and destroys or reduces the bacterial content of the water body. After finished, these coagulation adding systems, the flocculation loading system will be started. Design contact times for flocculation ranges from 15 to 20 minutes to an hour more than in this flocculation basin by the force of wind fan loading to mix suspended soil and settle in the bottom of the basin.

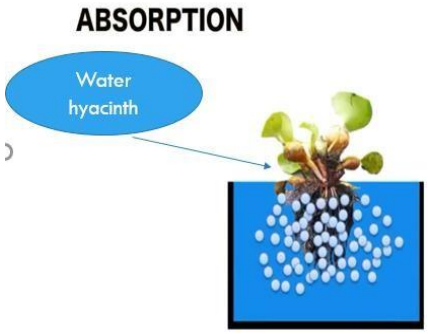


$$A1_2(SO_4)_3 + 3\,Ca(HCO_3)_2\,Al(OH)_3 + 3CaSO_4 + 6\,CO_2$$

E. *Absorption Process (Biological digestion System)*

In design for Eco-friendly wastewater treatment will have to use the biological digestion system as a second main process for the absorption method. In the biological system, absorption can tend as digestion systems in wastewater treatment. For those biological digestion systems, phytoremediation is known to be a possible method for removing pollutants treatment of wastewater and known as a better green remediation technology. Among them of photo remediation methods, Eichhornia crassipes (water hyacinth) is one of the best for wetland wastewater treatment. Water hyacinth has considerable attention as an aquatic plant which has capable of absorbing pollutants from rapidly proliferating aquatic environments. The most important use of water hyacinth includes the production of animal feed/fish feed, bio-sorbent for the removal of toxic metals, biogas and bioethanol processing, compost, pa-per-

manufacturing, also as a plant- mediation agent. And also, Indian scientists have proposed a variety of formulations of medicines that use water hyacinth to treat diseases. Also, after the removal of toxins from wastewater, water hyacinth can be used to recover certain hazardous and non-degradable materials such as heavy metals. The capability of water hyacinths, such as higher growth rate, pollutant absorption performance, low operating costs, and renewability, indicates that the use of this plant can be recognized as effective for wastewater treatment technology.



Absorption Process

According to recent studies in the last five years, the absorption and removal of organic, inorganic, and heavy metals present in wastewater using water hyacinth is an effective, affordable, efficient, and environmentally friendly technology for the treatment of wastewater. So that why it has decided to choose for those water hyacinth for my absorption biological digestion system in my design to treat wastewater. And also, it will be a description of the nature of water hyacinth and how to remove organic pollutants from wastewater. [9]

D. Water hyacinth Plant

Water hyacinth has also been introduced as an invasive and free-floating aquatic macrophyte by several botanists. It is a member of the family Pontederiaceae group. The growing of this plant on the water surface can decrease the penetration of sunlight into the water. Sunlight is important for many photosynthetic species, reducing sunlight means reducing the growth rate of photosynthetic organisms and, at the same time, affecting the ecological balance. Water hyacinth possesses long roots that are usually suspended in water. [10]

The root structure of aquatic plants, in particular water hyacinth, can provide an adequate environment for aerobic microorganisms to function in the sewage system. Aerobic microorganisms use the organic material and nutrient present in the wastewater to turn it into inorganic com-pounds that can be used by these plant. The main factor is this plan can be find around the nature or our surrounding easily. Water hyacinth can rapidly increase and growth by more than 60 kg per m2 of water surface area, that can have a critical effect on sustainable economic development.

Water hyacinth Plant

Application of aquatic plants in wastewater treatment for the removal of pollutants

Water hyacinth That is one application of aquatic plants in wastewater treatment for the removal of pollutants Wastewater is a mixture of fresh water with a large amount of chemicals compounds (including organic and inorganic) and heavy metals that can be produced from domestic, industrial and commercial activities, from storm water, surface and groundwater too. So that why, biological approaches are more important for wastewater treatment, and phytoremediation is one of the types of the biological wastewater treatment system. [11]

Among phytoremediation techniques, artificial wetlands (AWs) are considered to be the most effective wastewater treatment technology. Artificial Wetlands (AWs) will foster biodiversity through the creation of a large ecosystem for a wide variety of wildlife, such as reptiles, rodents, fish and birds. Generally, Artificial Wetlands are described as environmentally friendly, simple methods, economical, efficient and environmentally like technology) requiring less land space (minimum area).[12]

It should be noted that the selection of suitable species of plants is very important for those implementation of phytoremediation. The chosen species must have the following characteristics: (1) high ability to absorb both organic and inorganic pollutants; (2) high ability to grow faster in wastewater; and (3) easy control. Salvinia and E. Crassips towards the health and the environment, water hyacinth has more advanced impacts in terms of plant remediation efficiency, biogas generation, animal feed production and compost. [13]

I. Removal of heavy metals using water hyacinth

Bio- sorbents used to extract metal ions from wastewater may be divided into seven categories:

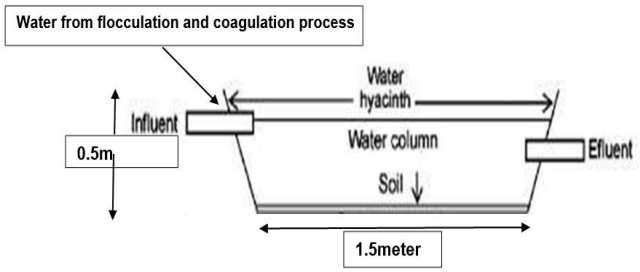
1. bacteria,
2. fungi,
3. algae,
4. sewage
5. sludge,
6. agricultural waste,
7. natural residues and
8. other biotechnology

The use of seaweed as the cheapest and most available resource that has gained a great attention as a biosorbent. [13, 14, 15] Water macrophytes with higher growth rates, such as water hyacinth, that can be used to remove heavy metals from wastewater. This plant recently gained attention as a potential absorbent for the treatment of wastewater contaminated with heavy metals. [14]

Heavy metal removal rate based on the ability of the water to extract by hyacinth is (Cu > Zn > Ni > Pb > Cd) and the higher and lower removal efficiency belonged to Cu and Cd, respectively. [17] For the treatment of one liter of wastewater contaminated with 1500 mg / L of arsenic, 30 g of dried water hyacinth root must be removed from the aqueous solution for a period of 24 h. [18]

Chromium (III) and the removal rate was found to be 87.52 percent with 10 mg of Cr/1 solution. [20] Hyacinth can absorb more than 99 per cent of phenol in a single and double solution of Cr and Phenol (10 mg / L) in 14 and 11 days separately. According to the study for the removal of heavy metals in aqueous solution using water hyacinth found that Langmuir and Freundlich models were well suited for the bio sorption of all metal ions. [21]. Heavy metals are absorbed by the roots of the plant, transferred to the shoots and other plant tissues where they are concentrated and the plant extraction can permanently remove these contaminants. [22], [23].

Water hyacinth has been thoroughly researched in the pilot and large-scale laboratory for the removal of organic matter in wastewater compared to other aquatic plants. Though, water hyacinth is known to be a permanent plant all around world, it is widely used as a major resource for waste management and agricultural processes. [24] According to laboratory analysis and tests, treated wastewater in the presence of water hyacinth for a period of 25 days resulted in a reduction (37, 47, 54 and 33%) of solids, calcium, magnesium and total hardness, respectively. Roots of water hyacinth are mainly involved in trans-portation, where the shoots have resulting in the aggregation of a substantial amount of nutrients (N&P) relative to the root region. [26], [27]



Design for Absorption Process (Biological digestion System)

Design for Absorption Process (Biological digestion System)

The dimension of the Absorption process (biological digestion system) basin is that the height is 0.5 meters from the top of the surface ground to the depth of the basin and the width is 1.5 meters long in my design respectively. After the finished the process of flocculation and coagulation, the wastewater will come to those Absorption basins where water hyacinth plants are used for the bio-sorbent process. And also, the wastewater will be sediment in these basins while crossing to this absorption basin for the bio-digestion system. I think that those water hyacinth plants are most suitable for growth with survival and easily can be found in our surroundings, especially South East Asia and also my country, Myanmar. Not only easily growth in nature and but also the public analysis results, I want to be used for the water hyacinth plants for the bio- sorbents process to my design. [28]

Filtration System in my design (Adsorption Filtration System)

Adsorption is the aggregation or concentration of substances on the surface or the layer. The adsorbing phase is called the adsorbent and the adsorbing material is called the adsorbing phase. Adsorption can take place between two phases, including liquid-liquid, gas-liquid, gas-solid, or liquid-solid interfaces. Certain heavy metals (manganese, iron, cobalt, copper, zinc, chromium, vanadium, potassium and molybdenum) are not only present in the solution of essential molecules but also play an important coenzyme role in various reactions. Metals such as lead, cadmium, mercury, silver, aluminum, barium, and arsenic at all concentrations are toxic and have long-term adverse effects. Organic pollutant wastewater produces large amounts of suspended solids which reduce the light accessible to photosynthetic organisms and, when settled down, change the characteristics of the river bed, making it an unsuitable habitat for many invertebrates. [27]

Organic products include pesticides, fertilizers, hydrocarbons, phenols, plasticizers, biphenyls, detergents, oils, fats, pharmaceuticals, proteins, and carbohydrates, etc. Toxic organic compounds are causing a variety of environmental issues for our environment. The most popular organic pollutants known as persistent organic pollutants (POPs). Many techniques, such as coagulation,

coagulation filtration, absorption, ozone, adsorption, ion exchange, reverse osmosis, and advanced oxidation processes, have been used to remove organic compounds from polluted water and wastewater. The adsorption process by solid adsorbents has the potential to be one of the most effective methods for the treatment and elimination of organic pollutants in wastewater treatment. Adsorption has advantages over other strategies due to its simple nature and that contains a low investment in terms of both the initial cost and the land needed.

Type of Absorbent for adsorption process

Various types of adsorbents are based on natural adsorbents and synthetic adsorbents. Natural adsorbents are included charcoal, clay, clay minerals such as silicates, zeolites, and ores. For certain cases, these natural materials are cheap, sufficient for supply, and have great potentials for modification and eventually development of their adsorption capabilities. Synthetic adsorbents are included adsorbents such as extracted from agricultural products and waste, household waste, industrial waste, sewage sludge, and polymeric adsorbents. Each adsorbent has certain characteristics such as porosity, pore composition, and also the nature of its adsorbent surfaces. The adsorption of activated carbons as an adsorbent for those organic pollutants is a complex phenomenon and there are still significant difficulties. The use of adsorbents to remove these elements is useful. Nowadays, several low-cost adsorbents, such as silica, activated carbon, and zeolite, are being researched from available natural compounds. Sand is naturally created from quartz sandstone

Adsorption on activated carbon

Activated carbon is made from high-carbon organic materials such as wood, lignite, and coal. Adsorption is known to be an important mechanism in most natural physical, biological, and chemical processes, and activated carbon is the most commonly used adsorbent element in the treatment of water and wastewater. Adsorption of activated carbon is currently the most commonly used method for the elimination of toxic contaminants from aqueous industrial sludge, surface water bodies, and drinking water. [32]

Activated carbon is an amorphous, microcrystalline, and non-graphic material with properties such as high thermal stability, high light stability, porous and rigid structure, high mechanical stability, high surface-to-volume ratio, and high purity. Also, since activated carbon has a high capacity for adsorption of different species, it may be an effective adsorbent for the removal of ions and organic material from aqueous media. There are two types of activated carbon for wastewater such as GAC and PAC. GAC adsorbed is used to approach activated carbon water or wastewater. Fixed-bed carbon absorbers may be operated under pressure or through gravity. Wastewater is applied at the top of the carbon column, flows down through the carbon layer, and is removed at the bottom of the column. [33]

GAC adsorption is also used for tertiary treatment of urban and industrial wastewater (physicochemical treatment after secondary treatment) or physicochemical treatment (coagulation, sedimentation, filtration, GAC adsorption) instead of biological treatment. I wanted to apply for tertiary treatment, GAC is primarily used to adsorb organic molecules that are not absorbed during biological treatment. Pretreatment is usually required before use with GAC application, such as precipitation of lime followed by rapid filtration. [26]

PAC is used by water treatment plants either on a full- time basis or when required to maintain the taste and smell or to extract organic chemicals. PAC can be fed as a powder utilizing dry feed or as a slurry using metering pumps. PAC is used for several applications, including the treatment of drinking water, swimming pool water, wastewater treatment, wastewater treatment, and industrial wastewater. It is also widely used in the pulp and paper processing industry.

Zeolite

Zeolites are mineral-crystalline ceramics and hydrated alkali and also alkaline earth metals with such a three-dimensional crystal structure. Zeolites are also categorized into two groups: natural zeolites such as clinoptilolite, analcime, limonite, phillipsite, mordenite, and artificial zeolites. Zeolite has a good ability to remove ammonia. Also, the presence of other cations induces damage and disturbance in ammonium ion adsorption. Many heavy metals, such as mercury, lead, silver, copper, cadmium, chromium, zinc, nickel, cobalt, and manganese ions, are found in polluted water. In the past, some research has been performed on the application of natural zeolite to heavy metal adsorption. [34] Zeolites are hydrated aluminum silicate minerals that contain aluminum, silicon, and oxygen in their common container. Compositionally, zeolites are the same as clay minerals but vary widely in their crystalline structure. Zeolite is known to be major adsorbents due to its high surface area, and loaded frame with amphoteric properties and high for adsorption capacity.

Silica Sand

Silica sand has been used to disinfect and purify water for a long time. The first recorded use of a sand filter dates back to 1804 when John Gibb built and installed an experimental filter. This method of filtration was improved over the next two decades, resulting in James Simpson 's construction of the world's first public water treatment plant for Chelsea Waterworks in 1829. Natural silica filtering sands have a sub- angular to the round shape, making it the ideal filtration medium for collecting suspended solids from wastewater.

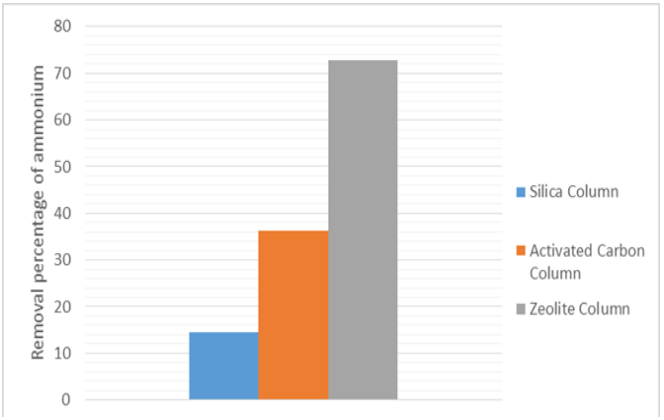
Due to its high content of silica, the sand is extremely durable and hard-wearing, enabling it to be graded specifically to facilitate efficient filtering. Silica sand is known as quartz sand, white sand, or industrial sand, consists of two primary elements: silica and oxygen. Especially, silica sand is made of Silicon dioxide (SiO_2). [32]. The Quartz – a chemically inert and fairly hard mineral – is the most common type of SiO_2. SiO_2 grades 7 out of 10 on the Mohs hardness scale, which is making it ideal to be used as filtration media and abrasive blasting sands. [35]

There is a lot of different usage for silica sand in the industrial and commercial sectors, from golf courses to glass production. Silica sand is a corporate and residential product that is widely available in North America. One of the most common uses of silica sand is in water filtration, whether well water treatment or tap water filtering. Due to its uniform shape and scale or size, silica sand is an efficient filtration bed that regularly extracts pollutants from the water. However, it does not degrade when exposed to acidified chemicals.

Analysis for removal of pollutant from wastewater by using activated carbon, silica and zeolite

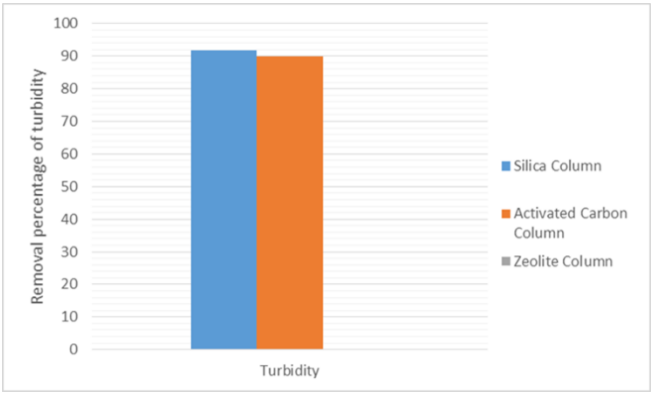
Adsorption of silica activated carbon and zeolite adsorbents has been investigated. For that end, three 50 cm columns were arranged under the same situations and the samples were allowed to pass through them. [34, 27]. The following graphs are the initial input water concentration containments and the situation of final results after wastewater pass through to that activated carbon, zeolite, and silica respectively.

Pollutant	*Pollutant concentration*	*Alternative chemical compound*	*Concentration of alternative chemical compound*
Phosphate	12 mg/L	Monosodium phosphate (NaH2PO4.2 H2O)	19.70 mg/L
Ammonium	5 mg/L	Ammonium solfate	18.34 mg/L
Iron	0.4 mg/L	Iron chloride	1.94 mg/L
COD	200 mg/L	Sodium acetate (CH3COONa. 3H2O)	mg/L
Turbidity	100 Ntu	Bentonite	Trial and error

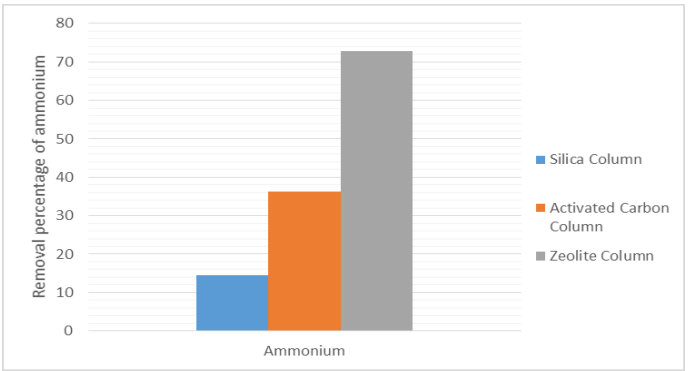


Comparison and effective of silica, activated carbon, and zeolite adsorbents by public Analysis

According to the final results of above graph, the amount of ammonium removal by silica, activated carbon and zeolite adsorbents. As can be seen in figure 1, zeolite has the maximum ammonium removal capacity (72 per cent). Also, the capacity of activated carbon is greater than that of silica.

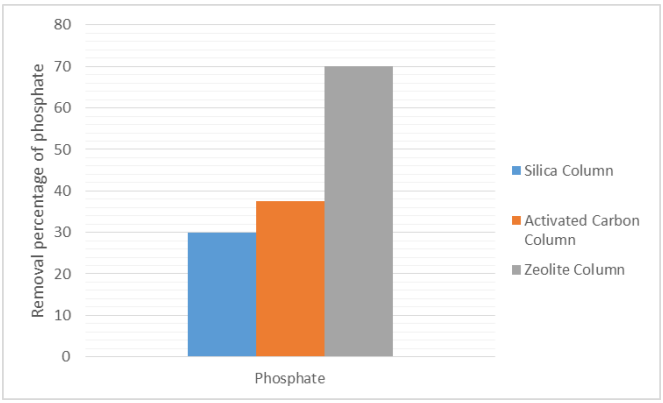


According to the final results of above graph Silica and zeolite have the strongest and weakest iron removal efficiency, respectively, as the ability of zeolite to remove iron is approximately negligible, however silica can remove 81% of iron. Activated carbon has increased iron removal efficiency relative to zeolite, but its efficiency is lower than silica

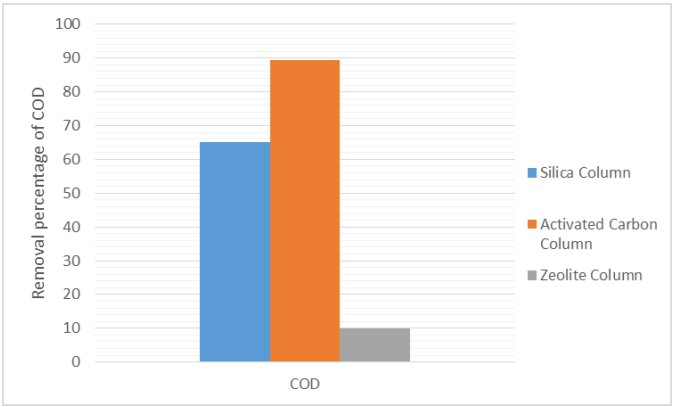


As seen in Figure, the decrease in turbidity in both systems is almost same and important. In general, both silica and activated carbon adsorbents have the potential to reduce turbidity.

Pollutant	*The initial concentration of pollutant*	*The concentration After silica*	*The concentration After zeolite*	*The concentration After activated carbon*	*The maximum permissible level in drinking water*
Ammonium (mg/L)	5.5	4.7	1.5	3.5	1.5 mg/L
Iron (mg/L)	0.55	0.1	0.5	0.35	0.3 mg/L
Turbidity (NTU)	100	8.1	-	9.7	5 Ntu
Phosphate (mg/L)	4	2.8	1.2	2.5	-
COD (mg/L)	200	70	180	21	0

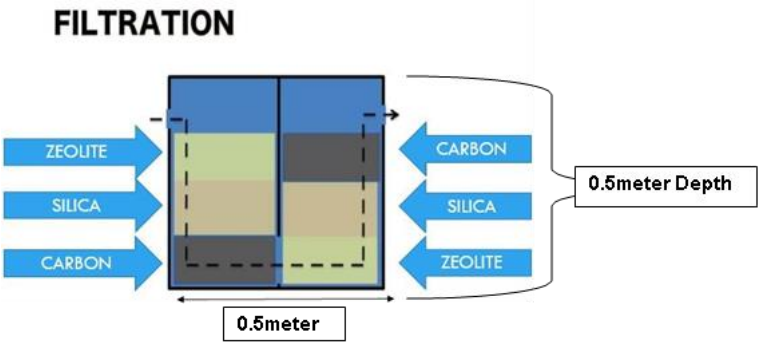


Through Figure 4, the phosphate pollutant decreases most (70 per cent) after passing via the zeolite adsorbent, that is more than two other adsorbents. In fact, the ability of activated carbon to eliminate phosphate is greater than that of silica.



As shown in Figure 5, the COD pollutant has experienced a significant decrease following the passage of activated carbon. And also, the ability of activated carbon in the COD removal is more than zeolite. In addition, zeolite has a marginal ability to remove COD.

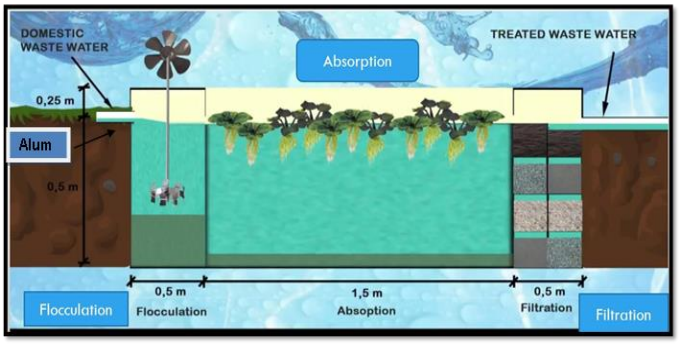
Design for adsorption process filters in Eco-friendly wastewater treatment



According to public analysis results, choose for those all of the absorbents of adsorption materials such as activated carbon, zeolite, and silica because of these three materials have good capacities, and that leads to being effective for removal of the pollutant from wastewater respectively.

The procedure for those filtrations is that the first layer is zeolite will use and second is silica sand and then the final portion or layer is activated carbon. And also another hand, the bottom is zeolite, the second layer is silica sand will use again and the top layer is activated carbon respectively. So that why, the incoming wastewater will pass through with top to bottom layers for zeolite, silica sand, activated carbon and then those wastewaters will again pass through to bottom to top layer such as zeolite, silica sand, and also activated carbon.

II. Over view main Design for Eco-friendly wastewater treatment



Over view main Design for Eco-friendly wastewater treatment

The above diagram shows the design for an eco-friendly wastewater treatment system by the combination of physical, chemical, and biological treatment methods. The influent domestic wastewater will come from households and then firstly pass through to the flocculation system where wind fan use for loading and sentiment to heavy metals and suspended solids in those flocculation basins. Before this flocculation system, we need to add alum to those wastewaters. In these basins, a flocculation basin where we can reduce electricity range and cost and also that can be effective to our natural environmental energy.

Design contact times for flocculation ranges from 15 to 20 minutes to an hour more than in this flocculation basin by the force of wind fan loading to mix suspended soil and settle in the bottom of the basin. The height of the flocculation basin is 0.75 meter and the width is 0.5 meter. The height of the wind fan turbine is 40.35-meter-long to get sufficient with air support to fan for loading shear.

After finished in flocculation system, these wastewaters will be pass through to the biological absorption system basin where water hyacinth plants are used for the bio-sorbent process. In these basins, hyacinth plants' roots will be performed as bio-digestion systems with organic and inorganic pollutants from wastewater. These plants are convenient for control to growth and have more absorption capacity among other plants and can grow 25 years to 25 year-long times in these basins. This water hyacinth plants are also can be made fertilizers in compositing digestion for Agriculture usage. They have high efficiency in absorption for mercury (Hg), manganese (Mn), and iron (Fe). Nowadays, hyacinth plants can be also used as medical use such as can use to control and adjust for glucose range in the human body. So that why After finished using wastewater with hyacinth plants which can also be used as medical products and fertilizer products. As these benefits, I want to use these hyacinth plants not only for wastewater treatment but also to produce other useful products to effectively and support our surroundings and environments. The design for those basin is that the height is 0.5 meters from the top of the surface ground to the depth of the basin and the width is 1.5 meters long in parameters.

After all these two steps, the influents water will also pass through to the final filtration system where are adsorption process occurs by the combination of activated carbon, zeolite, and silica sand respectively. The procedure for those filtrations is that the first layer is that zeolite will use, the second layer is silica sand and then the final part is activated carbon. And also another hand, the bottom is zeolite, the second layer is silica sand will use again and the top layer is activated carbon respectively. So that why, the incoming wastewater will pass through with top to bottom layers for zeolite, silica sand, activated carbon and then that wastewater will again pass through to bottom to top layer such as zeolite, silica sand and also activated carbon step by step with systematically. For those filtration basins, the depth (height) of the basin is 0.5-meter longs, and also the width is the same with 0.5-meter parameters.

Benefit of Design for Eco-friendly wastewater treatment

Design for eco-friendly wastewater treatment is a sample method and also there is another high cost- effective advance system. Therefore, the first factor of benefit is that this design and system will reduce the construction cost and also maintenance. A wastewater treatment facility also should generally include physical-chemical clarification and metals removal. Between 100–500 GPM, equipment for a wastewater treatment facility will cost anything between $200,000–$700,000, which depends on the number of pollutants concerning the local discharge regulations. And also, we can reduce the electricity rate and cost in this design. In the bio-digestion system, there is water hyacinth plants are used and after reached limited time for plant growth periods in these basins, we can use these waste of water hyacinth plants as a compositing product and also medical products.

IV. Conclusion

Water resources are very important for all living things and our environments of the ecosystem too. We have to protect on not only our water resource but also other natural resources for next our generations. If we don't care and protection to these many environmental problems, our natural and environment will be destroyed and in fact with a lack of natural energy and resources from those environments coming soon. Among them, the various methods and processes for wastewater treatment are very important and essential to protect the water resource. So that why design and technologies are also important to get high efficiency and cost-effective in those wastewater treatment plant. In this paper, introduced to the design of an eco-friendly system for wastewater treatment with the combination of physical, chemical, and biological methods. we need to have treat water and use it for our daily life. I think that not only save water but also cost-effective or save money are more survival for wastewater treatment in developing countries. Design for Eco-friendly wastewater treatment, a combination of wastewater treatment can use domestic wastewater to treat by the combination methods of physical, chemical, and biological processes.

In developing, especially, my country, Myanmar, there are a few domestic wastewater treatments. So, I think that these eco-friendly designs can help to treat domestic wastewater and also reduce money for the general plant cost of design. And also, water hyacinth plants can produce economic products and produce agriculture fertilizers. energy consumption and supporting country economic products and development, these Eco-friendly wastewater treatment is the best convenient and effective support to our environment and natural saving more and more

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