POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

pH FILTER IV

NAME	REGISTRATION NUMBER
MUHAMMAD HAMZAH BIN OSMAN	08DPB17F1213
KHAIRUL BIN ROSLAN	08DPB17F1200
NATASYA SYUHADA BT MOHD NAWAHIDUDIN	08DPB17F1219
NURUL KHADIJAH BT PAKRI	08DPB17F1210

CIVIL ENGINEERING DEPARTMENT

JUNE 2019

ACKNOWLEDGEMENT

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This report is submitted to the Civil Engineering Department as part of the award of the Diploma in Building Services Engineering

CIVIL ENGINEERING DEPARTMENT

ACKNOWLEDGEMENT

Praise be to Allah Almighty for the owners of nature, be thankful for His divine presence Taqik and his guidance, has given us permission to complete the Final Year Project Report, our year-end project report book is a tribute to everyone involved in helping and providing helpful guidance when we complete our Final Year Project, semester 4 through semester 5 in 2019.

We would like to take this opportunity to express our gratitude to all who have so much helping us throughout the final year project. I want to extend our sincerity thanks to our supervisor, Madam. Nazrizam Bt Ab Wahab, for her help and guidance the progress of this thesis project. Throughout the year, Madam. Nazrizam Bt Ab Wahab has been patient monitor our progress and guide us in the right direction and offer encouragement. Clearly the progress we have made now would not have been possible without her assistance.

And also not forget teammates Muhammad Hamzah Bin Osman, Natasya Syuhada Bt Mohd Nawahidudin and Nurul Khadijah Bt Pakri who have been together from the beginning to the end of the Final Year Project to complete the project. I would like to thank Polytechnic Sultan Salahuddin Abdul Aziz Shah (PSA) and most importantly I thank my family for their encouragement never failed and the financial support they've given me over the years. I want to thank you again and may Allah bless us all.

ABSTRAK

Penapis air digunakan sebagai penapis untuk air kotor yang mempunyai nilai pH yang tinggi yang akan menyebabkan penyakit berisiko, warna air yang keruh dan bau. Penapis ini boleh mengelakkan masalah pencemaran air sebelum dibuang ke saliran sungai. Masalah ini menjadi semakin berleluasa kerana pengguna kurang pencerahan tentang perkara ini yang boleh merosakkan kesihatan. Umumnya, penapis air ini mempunyai saluran air masuk dan keluar terus sebelum ia mengalir keluar ke longkang. Filter pH IV telah diubahsuai dari konsep asal penapis air kepada penapis air dari mesin basuh yang berfungsi untuk mengurangkan nilai pH, menghilangkan bau dan menukar warna. Filter pH IV bantu untuk mengurangkan pencemaran air yang mengikut kualiti indeks air yang dibenarkan oleh Jabatan Alam Sekitar. Servis dobi khidmat diri selama 24 jam yang semakin meningkat menyebabkan air kotor yang dikeluarkan dari perkhidmatan dobi tidak dapat dikendalikan. Projek ini menggunakan konsep mudah di mana ia hanya menggunakan bahan semulajadi sebagai penapis. Penapis ini juga dikenali sebagai mesra pengguna kerana ia mudah dibersihkan dan diselenggara. Atas dasarnya, penapis pH IV diletakkan di sebelum air basuhan keluar dari premis dobi.

ABSTRACT

Water filter is use as filtration for dirty water that have a high pH value that will cause a risky disease, murky water color and an odor. The filter can avoid the problem of water pollution before being discharged to drainage. Water filters have become increasingly prevalent as consumers have to the water faucet become more health conscious. Typically, these water filters attach directly outlet and filter water as it flows out of the faucet. The pH IV filter has been modified from the original concept of water filter to filtration of water filter from washing machine that works to reduce the pH value, eliminates odor and change color. Its helps us to decrease water pollution channeled out of the laundry outlet as stated by Department Of Environment. As the self service servicing for 24 hours is increasing, dirty water discharges from the laundry service can not be controlled.This project use an easy concept where it only use natural substances as the filtration. This filter also known as user-friendly because it easy to clean and maintenance. On the basis, pH filter IV is placed at in and out outlet of the filter before being discharged to the drain.

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DECLARATION OF AUTHENTICITY

TITLE : pH FILTER IV

SESSION : JUNE 2019

1. We, **1. MUHAMMAD HAMZAH BIN OSMAN (08DPB17F1213)**

2. KHAIRUL BIN ROSLAN (08DPB17F1200)

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Civil Engineering Department, Politeknik Sultan Salahuddin Abdul Aziz Shah in the address **Persiaran Usahawan, 40150 Shah Alam, Selangor.**

2. We acknowledge that the above-mentioned 'project 'and its intellectual property are the originals of our original works / creations without taking or imitating any intellectual property from others.

3. We agree to transfer the intellectual property of 'the project' to 'the Polytechnic' to meet the requirements for award **Diploma in Building Services Engineering** to us.

Made and actually acknowledged by it;)

a) MUHAMMAD HAMZAH BIN OSMAN) ……..

(Identification No: 990429-14-5313)) MUHAMMAD HAMZAH BIN OSMAN

b) KHAIRUL BIN ROSLAN)……..

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d) NURUL KHADIJAH BT PAKRI)……

(Identification No. 990503-06-5128)) NURUL KHADIJAH BT PAKRI

at ……, on……..)

In front of us, NAZRIZAM BT AB WAHAB)……..

(760818-01-5064) as a project supervisor.) NAZRIZAM BT AB WAHAB

LIST OF TABLE

LIST OF DIAGRAM

Note :

List of diagram according to page

LIST OF SYMBOL

Symbol	
h	hours
m^3	cubic metre
mg/L	microgram/ litre

Note :

List of symbol according to alphabet

LIST OF SHORT FORM

Short form	
DOE	Department of Environmental
MCLG	Maximum Contaminant Level Goal
TT	Treatment Technique

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

Self service laundry is a business where the owner is no need to be in the business premises for conduct business processes. However, there is also a self-service laundry store that provides employees or shopkeepers to help customers if they need current assistance washing and drying processes. Customers only need to use a coin or coin system for start washing machine and dryer. The advantage of this self service laundry concept is most laundry premises are available for 24 hours a day and offer a good price .There are also weaknesses or disadvantages when laundry premises operate for a long time as an example of dirt pollution and the increase in pH value resulting from laundry washing results The heat release caused by the use of clothes dryer machine has negative influence and direct water discharge directly into the drain becomes a major problem to society local.To prevent prolonged adverse effects I think that filters that work to reduce water pH and reduce stench and dirty water color are essential products so that the environment is not destroyed for the future.

'pH Filter IV' is introduced to reduce the pH water level, removes odors from detergent that been used at laundry and change the water's colour to natural. Process of waste water from laundry cause the reaction between detergent/soak and water turn into ammonia; strong alkaline. The waste water turn into a high pH water value (alkaline). Basically, ammonia makes the water become smelly and changes the water colour into blackish gray.

1.2 BACKGROUND

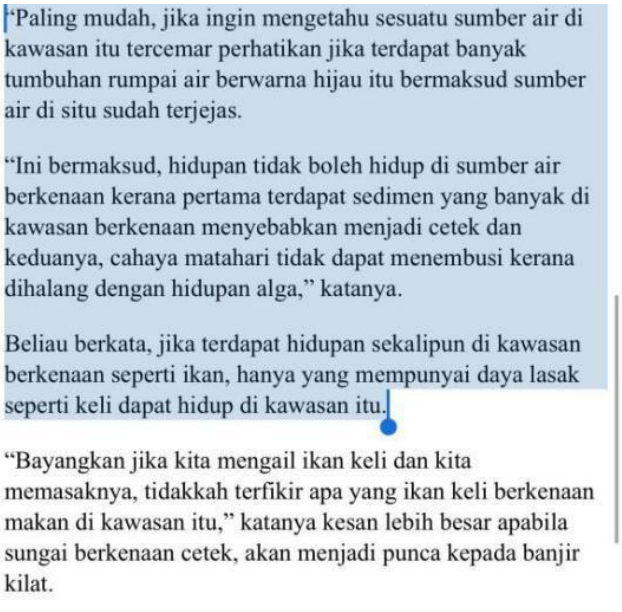
Water flows through a filter designed to remove particles in the water. The filters are made of layers of sand and gravel, and in some cases, crushed anthracite. Filtration collects the suspended impurities in water and enhances the effectiveness of disinfection. People still do not realize how important to have clean and untreated water to be used. Untreated means not conserved, altered or upgraded by the use of a physical, chemical or biological agent. Whereas, untreated water is non-potable water that has been subjected to any process intended to eradicate infection of bacteria, viruses and parasites. Filtration is one of the processes to ensure our clean water is safe from physically contamination. Filtration is the mechanical elimination of turbidity particles by passing the water through a porous medium. The purpose of filtration is to reduce all the turbidity particles carried over from the sedimentation phase, hence producing shimmering clear water with almost zero turbidity.

The filters are routinely cleaned by back washing. PH Filter IV help to low the pH water level from the self service-laundry before the water flushed out to drainage system. Clean, safe water is vital for every day life. Water is essential for health, hygiene and the productivity of our community.

1.3 PROBLEM STATEMENT

From Utusan ,Friday on May 6, 2016 reported that residents in the area claimed that the stinking smell from the laundry store was due to the chemicals released during the process of washing and drying clothes. The pollution was borne by 200 residents and businessmen around the premises.

Metro, Saturday on September 16, 2017 Deputy Dean (Research, Development and Publication) Faculty of Civil and Environmental Engineering (FKSAS) Universiti Tun Hussein Onn Malaysia (UTHM) Prof Dr Norzila Othman said whenever pollution occurs on water sources, it will experience physical changes including the color that will be grayish black on the smelly and unpleasant smell. Physical changes include these colors and odors on water sources such as this river in line with the impact on water resources in the area.This means that life can not live in water sources because there are so many sediments in the area causing to be shallow and both, sunlight can not penetrate because it is prevented by living beings. Laundry is the one of the sources of water pollution.


"Paling mudah, jika ingin mengetahu sesuatu sumber air di kawasan itu tercemar perhatikan jika terdapat banyak tumbuhan rumpai air berwarna hijau itu bermaksud sumber air di situ sudah terjejas.

"Ini bermaksud, hidupan tidak boleh hidup di sumber air berkenaan kerana pertama terdapat sedimen yang banyak di kawasan berkenaan menyebabkan menjadi cetek dan keduanya, cahaya matahari tidak dapat menembusi kerana dihalang dengan hidupan alga," katanya.

Beliau berkata, jika terdapat hidupan sekalipun di kawasan berkenaan seperti ikan, hanya yang mempunyai daya lasak seperti keli dapat hidup di kawasan itu.

"Bayangkan jika kita mengail ikan keli dan kita memasaknya, tidakkah terfikir apa yang ikan keli berkenaan makan di kawasan itu," katanya kesan lebih besar apabila sungai berkenaan cetek, akan menjadi punca kepada banjir kilat.

Diagram 1.1 Utusan Online and Metro newspaper.

Diagram 1.2 The worker told that the waste water from laundry cause unpleasant smell

1.4 OBJECTIVES OF THE PROJECT

This study focuses on solving the problem of water pollution, especially the washing laundry with objective :

I. To reduce the pH water that follow the classification water index(5.5-9) according to Department Of Environment

II. To reduce the odors especially in the area near the laundry

III. To ensure that laundry water is released into the drain according to the Department of Environment's water index classification.

Diagram 1.3 Illustration of filter

1.5 SCOPE OF THE PROJECT

The main scope for the PH Filter IV is in self-services laundry. The filter will be connect to the laundry wash water pipeline before it is discharged directly into the drainage system. The wash water from laundry will undergo into the PH Filter IV. The materials and chemicals in PH Filter IV will assist to reduce the pH water value, odors and change the water colour to normal colour. PH Filter IV is user-friendly product because premise guard can clean and replace filter material without any maintenance services. The others scope of project is residential area.

Diagram 1.4 One of Self-Services Laundry near TTDI

Diagram 1.5 Residential Area

These are few self laundry near TTDI:

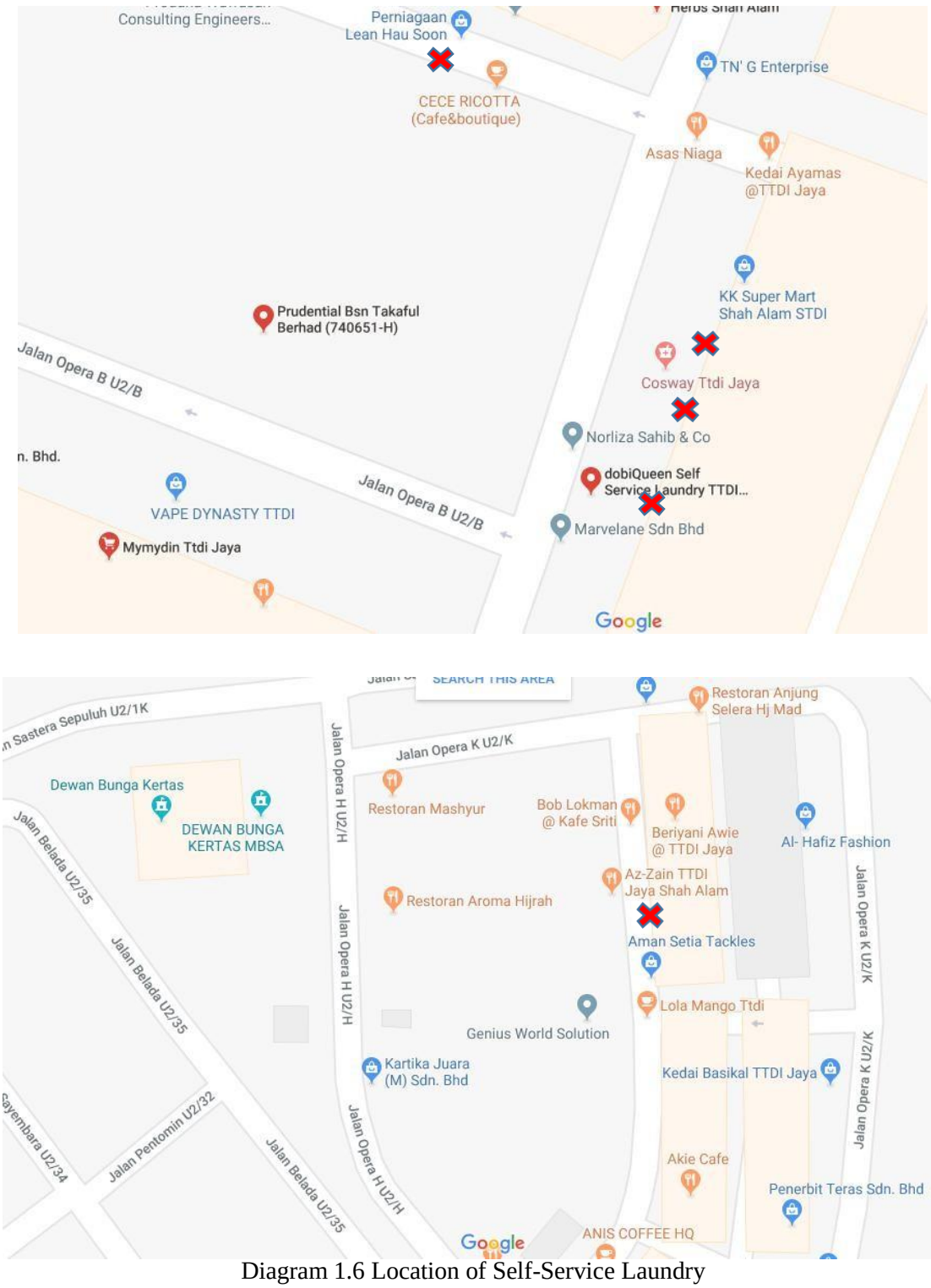


Diagram 1.6 Location of Self-Service Laundry

1.6 PROJECT SIGNIFICANCE

As the discharge requirements for treated secondary effluent become more restrictive, effluent filtration is becoming a more integral part of secondary treatment. A high quality effluent is produced after filtration, the potential for reusing treated effluent is being examined by a number of municipalities, especially those in the water-short areas. A new concept of filtration in reuse applications and an innovative filter technology is being used to help alleviate some of these problems. It can educe the odor, lower the pH level and changes the colour into normal.

1.7 DEFINE OPERATIONAL

PH Filter IV is the process of removing or reducing pH water level, odor and change the water colour to normal before release to drainage system from contaminated water to produce safe and clean water for a specific purpose.

i. Water filter - A device for removing unwanted substance such as bacteria or harmful chemicals from water

ii. pH - A measure of the concentration of hydrogen ions

iii. IV - Are 4 materials used to achieve project objectives which is to reduce the value of the water pH from alkaline to weak alkaline, to reduce the odors especially in the area near the laundry and to reduce damage to the environment as an example,water pollution

1.8 CONCLUSION

Through this investigation, our filtration methods will prove helpful even though they were done on a small scale. If this method was expanded, it would be able to improve several factors of self-services laundry, including pH levels, odors and colour. The water quality is increased and is therefore safer to release to the drain.

By completing this project, we will make more aware of other water filtration methods, practicality, and their benefits. Low quality water can lead to health hazards that can be avoided by putting into place these safe, inexpensive, and effective water filtration techniques.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter, the terms and concepts used in this project will be explained in detail for further understanding about the improvement of filter that been used in self laundry that will be enhance in a new way that are using the pH Filter IV. Furthermore , the literature review from past project will be attached as a guide comparison to the title of this project . Modification and innovation have been made from the previous project brought over to enhance and improve the new pH Filter IV.

PH Filter IV also helps in reducing the pH value with new and more efficient way, but also reduce the odour. In support of Vision 2020 (towards achieving developed nation status), Malaysia will conserve and manage its water resources to ensure adequate and safe water for all (including the environment). Such is the Malaysian vision for water in the 21st century.

Diagram 2.1 Illustrate water process in the filter

It is important to get more information about the previous filter that being used in self service laundry and our product (pH Filter IV). We want to see the contrast and comparison to make sure our product is suitable with our scope project. It can help us to achieve the objective and also can protect our product from any duplicated that might happen in future .The innovation of this ‘pH Filter IV’ is we are using natural ingredients.

2.2 CONCEPT/ THEORY

This project focuses on developing a filter that can be applied for people that used the self-service laundry. The pH Filter IV helps to keep the water's colour clear, reduce the bad odour, change the pH value (from strong alkaline to low alkaline). This filter is focuses on users of self-services laundry, services laundry and resident house. The filter was made to help reduce the water pollution before it released to the drainage system. Surface water is subject to runoff and other source contamination, filtration is necessary to remove suspended material for both aesthetic and public health reasons.

2.3 PREVIOUS RESEARCH

2.3.1 Filtration

The removal of suspended solids by filtration plays an important role in both natural purification of groundwater and in the removal of naturally occuring the treatment indeed particulates water in treatment plants.

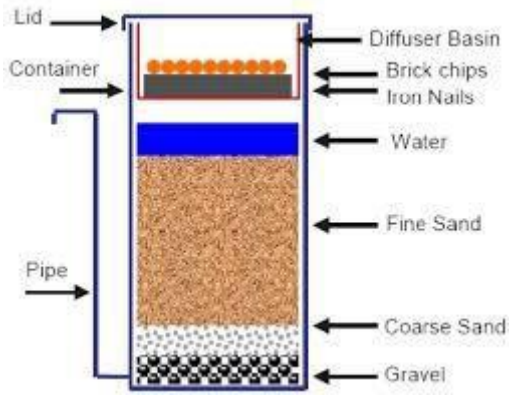


Diagram 2.2 Example of Laundry Filtration

In the natural filtration process, most suspended material is suspended material is removed from groundwater as the water percolates through the soil. It is therefore not usually necessary to filter underground water. One exception is when the water must be treated for removal of hardness, iron, or manganese. In these instances, the water usually must be filtered to remove the chemical percipitates. Another exception relates to systems designated by the state as being "under the direct influence of surface water." These systems must provide filtration treatment.

2.3.2 Introduction Of Water Filter

Diagram 2.3 Example of Water Filter that been used in laundry

While a great variety of filters are used in water and wastewater treatment practice, they can differentiated by their mode of action into two broad group: (a) deep-bed filter and (b) surface filters.

The traditional filter type used in water treatment is the deep-bed filter, consisting of permeable granular medium (commonly silica sand) through which the water to be filtered flows, and within the pores of which particulate material is retained, hence the description ‘deep-bed’.

2.3.3 Deep-Bed Filter

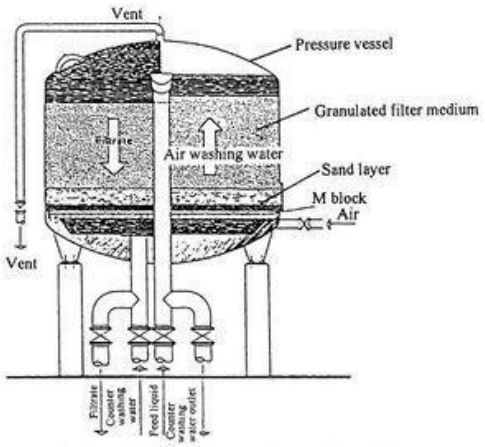


Diagram 2.4 Cross Section Of Deep-Bed Filter

The process of filtering water through beds are granular media in order to purify it is in general use throughout the world. Many different types of filter are used with the principal objectives removing microscopic suspended particles from water. The filters may be broadly classified as ‘rapid’ or ‘slow’ according to the rate at which they operate, with the further distinction that in slow sand filtration there is biological activity, whereas in rapid filtration physical removal is the important factor. The process is dynamic one in which the change in concentration of the suspension flowing through the bed is a function of depth and time.

2.3.4 Rapid filter underdrain systems

The underdrain system in rapid filters is designed to transmit filtrate and to ensure a uniform distribution of back-wash water and, where used, air. It must also prevent loss of sand with filtrate. Many types of underdrain system have been devised. The most widely used system consists of a set of perforated pipe laterals surrounded by graded silica gravel layers. The main function of the gravel layers is to distribute the back-wash upflow evenly over the bed area and prevent the penetration of the sand into the pipe lateral system. Pipe lateral are usually 75-100 mm diameter and are spaced at 150-225 mm centre, with orifices of 6-12 mm diameter at similar centres, discharging downwards. They are connected to a central pipe or a channel manifold. The manifold and lateral system are hydraulic designed to ensure a uniform distribution of back-wash water over the filter area. Where air is used for filter cleaning, a separate air manifold and lateral system are provided. Alternative underdrain systems incorporating nozzles o no-fines porous concrete may partly eliminate the need for gravel layers and may also provide for air distribution.

2.3.5 Settlement tank design parameter

There are two basic considerations; Upward Flow Rate and Retention Time.

Upward Flow Rate

As solid particle are gravitating downwards against an upward flow of liquor, the upward flow rate (UFR) is of prime importance. This is expressed in metre per hour, and is also known as the surface loading, or surface overload rate, defined by the equations:

$$\frac{\text{Effluent feed rate/ hour } (m^3/h)}{\text{Tank surface area } (m^2)}$$

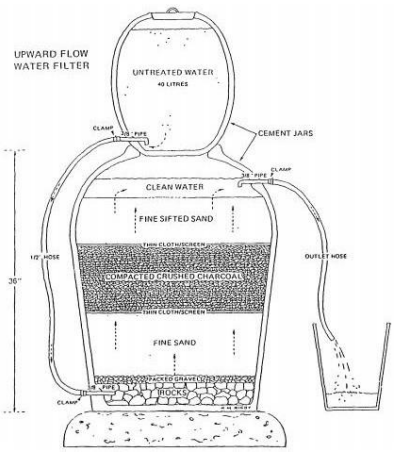


Diagram 2.5 : Illustration of Upward Flow Rate

Retention Time

The second design consideration is to give sufficient time for the solid particles to reach the tank base or underlying sludge layer, i.e the retention or detention time of the effluent within the tank. This is simply defined as:

$$\frac{\text{Tank Volume } (m^3)}{\text{Effluent feed rate/ hour } (m^3/h)}$$

2.3.6 Alkalinity and pH.

Biological nutrient removal systems also need pH control or added chemicals (e.g., hydrated lime, soda ash, or caustic soda) to supplement the available alkalinity. Because alkalinity is consumed during nitrification, the chemicals can help maintain the minimum alkalinity level needed (typically, 60 to 100 mg/L of alkalinity as calcium carbonate). Low alkalinity level not only lowers pH but may limit the growth of nitrifying organisms because they lack enough inorganic carbon to produce new cells.

The Victorian method of adding lime as a slurry to sewage has been revitalised recently and is worthy of mention as it can be a useful physicochemical treatment for an overload works, reduce bacteria numbers in discharge to sea where the high pH will be a least concerned and assist in phosphate removal prior to discharge to inland water where eutrophic conditions exist. The use of both lime and aluminium sulphate in an upward flow clarifier are described by Jones *et al.* (1991).

2.3.7 Disease from unhealthy water

Contaminant	MCLG (mg/L)[2]	MCL or TT (mg/L)[2]	Potential Health Effect from Ingestion of Water	Sources of Contaminant in Drinking Water
Hexacchlorocylopentadiene	0.05	0.05	Kidney or stomach problems	Discharge from chemical factories
Lindane	0.0002	0.0002	Liver or kidney problems	Runoff from insecticide used on cattle
Methoxychlor	0.04	0.04	Reproductive difficulties	Runoff from insecticide used on fruits
Oxamyl (Vydate)	0.2	0.2	Slight nervous system effects	Runoff from insecticide used on apples
Polychlorinatedbiphenyls (PCBs)	zero	0.0005	Skin changes; thymus gland problem	Runoff from landfills; discharge of waste chemicals
Pentachlorophenol	zero	0.001	Liver or kidney problems	Discharge from wood-preserving factories
Picloram	0.5	0.5	Liver problem	Herbicide runoff
Simazine	0.004	0.004	Problem with blood	Herbicide runoff
Styrene	0.1	0.1	Kidney, liver or circulatory systems problem	Discharge from rubber and plastic factories

Diagram 2.6 Disease from unhealthy water

2.3.8 Water Treatment Filtration

The removal of suspended solids by filtration plays on important role in both the natural purification of groundwater and in the removal of naturally occur and treatment induced particulates water in treatment plants. In the natural filtration process,most suspended material is removed from groundwater as the water percolates through the soil. It is therefor not usually necessary to filter groundwater. One exception is when the water must be treated for removal of hardness ,iron,or manganese. In these instances, the water usually must be filtered to remove the chemical precipitates. Another exception relates to system designed by the state as being , under the direct influence of surface water. These system must provide filtration treatment because surface water is subject to run off and other sources of contamination, filtration is necessary to remove the suspended material for both aesthetic and public health seasons. water treatment,(fourth edition) Principles and practices of water supply operation,American water work association

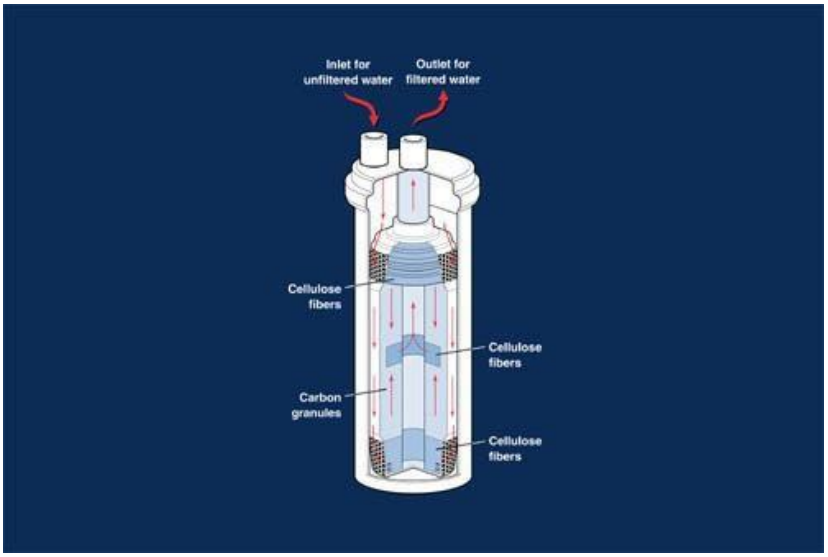


Diagram 2.7 Water treatment filter

2.4 CONCLUSION

Overall, by studying the previous study of filters I can understand the actual concept of existing water filters. Through this literature review the understanding of pH Filter IV and its systems for use can be improved with an introduction that describes the water filters used in ancient times until now .After analyzed the filter available, there are several components that need to be emphasized in the development of the filter. The concept of home water filters has given the idea to create a water filter that can restore water quality from laundry wash. As observations, many modification that needs to be done in order to improve the pH filter to a filter that is more efficient and easier to use in the future. Finally, it can be concluded that literary studies are a study of something to be done such as a water filter where some of them provide indirect enlightenment. Based on the results of studies that have analyzed the filter available, there are several components that need to be emphasized in the development of the filter. The study gives an overview of the past and the idea was to build a pH Filter IV.

CHAPTER 3
METHODOLOGY

3.1 INTRODUCTION

The process of analysis and design has an important role for a development in a project. The main objective of the project analysis and design is to ensure the pH Filter IV can provide the need of the users and understand the purpose of this filter be developed. Analytical and design systems that have a detailed structure. Prescriptive form, which divides projects into phases. Each phase is divided into steps that contain a complete list of tasks either inputs and outputs. Each phase must be resolved before move to next phase.

In this chapter, we are going to discuss the development of methodologies and phases that been used in the construction of the pH Filter IV. Function of pH Filter IV is to reduce the pH level of the water before it is piped out from self-service laundry. The topics of the project design, logical design and the needs of a suitable material and tools used will be discussed in this chapter. This chapter will also discuss the development of each phase of planning, analysis phase, design phase, and phase of development.

3.2 RESEARCH DESIGN

An analysis of structured and object-oriented analysis is a method that can be used to innovate pH filter. The pH filter is using a structured analysis which is the traditional method that is still used by analysts as a methodology for innovating this pH Filter. Structured analysis conducted according to overall planning. System Development Life Cycle (SDLC) is a technique used in structured analysis which has 5 phases, namely planning, analysis, design, implementation and support, and operation of information systems. SDLC is used to plan and manage the development process of the system. All development activities and functions in the system will be explained and describe in the SLDC depend on the approach used.

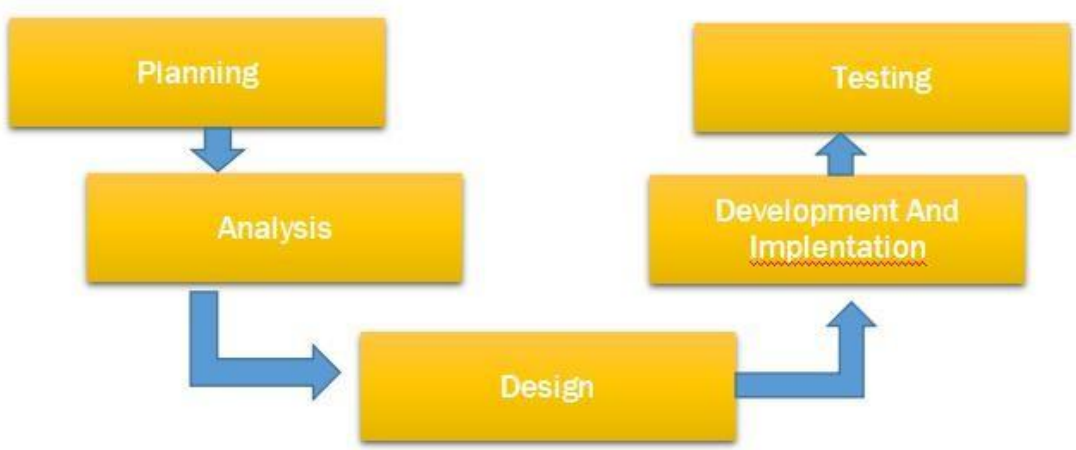


Diagram 3.1: System Development Life Cycle

There are two fundamental principles that lead the life cycle of systems development projects that developed in different phases. Each phase must be complete before the next phase begins. In using the Waterfall Model, the starting point and the exit point of each phase is defined / identified in advance. The output of the phase will be the input for another phase. Each phase will generate revenue for the next phase, namely:

1. Planning Phase = Innovation filter and a feasibility study.
2. Analysis Phase = Proposed filter
3. Design Phase = Specification Filter
4. Implementation Phase = Specification implementation filter
5. Testing Phase = Continuing operations

3.2.1 Planning Phase

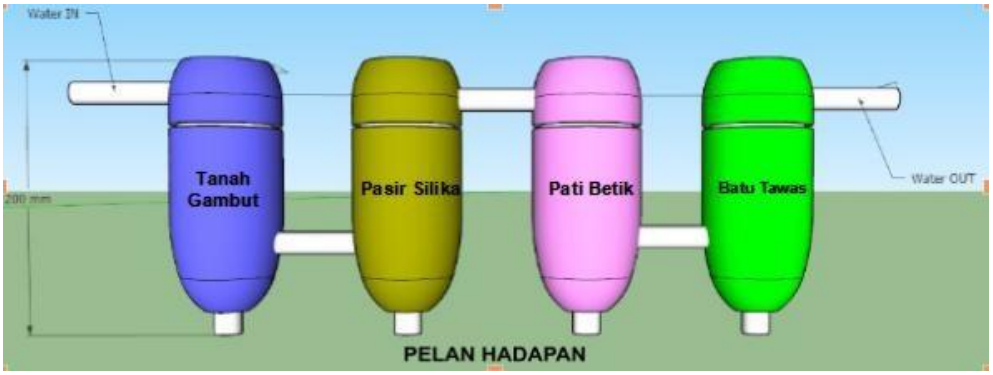


Diagram 3.2 Illustration of pH Filter IV

This was the beginner of pH Filter IV. The filter have 4 types filter with difference substances inside it. Which is peat*(tanah gambut), silica sand(pasir silika), papaya essence(pati betik) and alum stone(batu tawas).*

3.2.2 Analysis Phase

Data collection methods

This section describes the methods used to collect data to achieve the objective of the study.

Questionnaire

The quantitative method was selected for data collection conducted using questionnaire. The questionnaire was transmitted online to respondents to assist research and data collection. Data collection period lasts from 1 April until 7 April and 66 respondents has been involved.

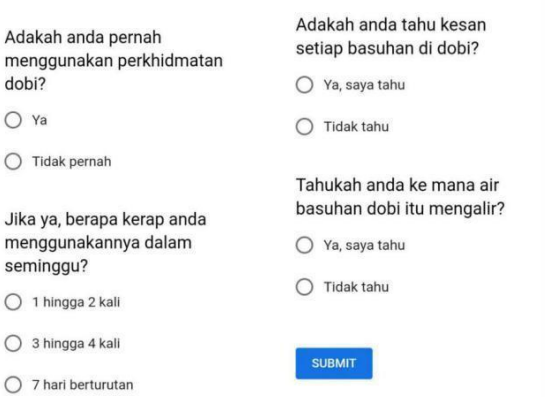


Figure 3.3 Example for online data collection thru on google form

3.3.3 Design Phase

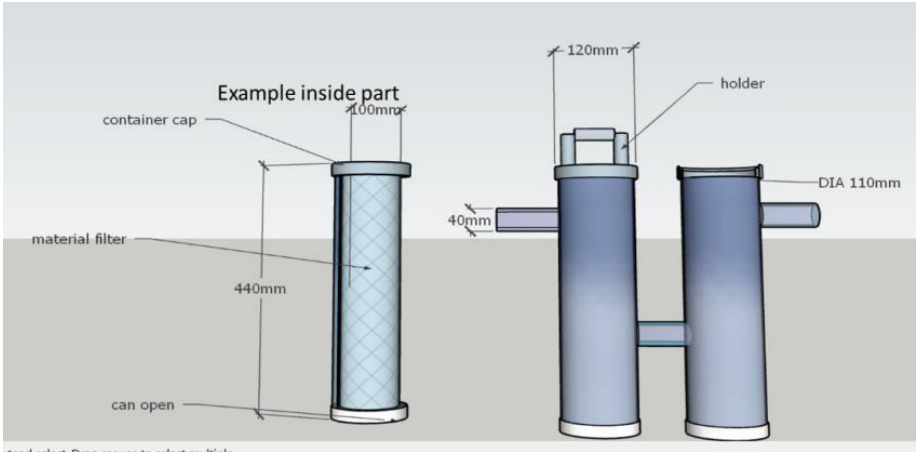


Diagram 3.4.1 Specification of PH Filter IV in Sketchup

Diagram 3.4.2 pH Filter IV

We decided to change the design of the filter. We want to make it small which is relevant with nowadays and this design could save more budget.

3.3 METHOD OF DATA COLLECTION

This section describes the methods that we use to collect the data to achieve our research objectives. In order to collect data, various methods have been processed and made possible by a variety of techniques to collect any probability to get detailed data and obviously, from an environment that includes the sources of internal and external sources by reference, Reading and research through a variety of materials, especially reference books, journals, articles, Internet and so on. Among the data collection techniques used were questionnaires, observations and surveys and interviews.

3.3.1 Questionnaire

Quantitative methods was selected for data collection by using google form. Questionnaires were transmitted into online to the respondent for our data collection in our study. The data collection period lasted for a week from 1 Mac 2019 until 7 Mac 2019. 65 respondent were involved in this study.

3.3.2 Observation

Observation and survey is a method or technique of data collection is important because the process of observation and surveys should be made in the case studies to obtain more precise information and details of the project undertaken. This includes the use of time to record the presence and the time taken after completion record attendance marked. Each survey and observations will be recorded as a reference.

3.3.3 Interview

The interview was conducted by interviewing owners and users of self-service laundry that are involved in the construction of this filter, it's important to find out more about how the respondent if the filter is developed, even to interview the respondent, the information obtained by the interaction can be helpful in providing suggestions and opinion if this filter developed.

3.4 STUDY OF INSTRUMENT

The instrument can be stated here is by giving questionnaires to face the laundry owner. This questionnaire has some questions and was distributed to respondents consisting of students, faculty, and staff of the PSA. They also use the laundry on weekends. This questionnaire is intended to review and ask for opinions about the vulnerabilities in filters water before. This questionnaire is also reviewing the project to be carried out if it gives advantages to users in the future and to ensure its use is able to achieve its main objectives.

3.5 TECHNIQUE FOR SAMPLING

As a result of the questionnaire, we found that 92.4% out of 22 respondents stated that they had used laundry services while 7.6% stated that they never used laundry service.

The frequency of laundry use during the week, the amount of laundry used one to two times was the highest where 46.9% respondents were followed by 7 days consecutively followed by 26.7% and the rest were 3 to 4 weeks by 23.4%.

However, 64.6% respondents did not know where the laundry was flowing and 35.4% respondents knew the washing water from the laundry. the latter is related to the knowledge of the impression of each laundry in laundry.

3.6 METHODS OF ANALYSIS DATA

Each data gathered from the survey were processed and analyzed to see how this project could give an advantage to the user. Through the analysis of this data can be seen the percentage of respondents that agree and not agree percentage of respondents on the implementation of this filter to the students, lecturer, and staff of the PSA.

3.7 CONCLUSION

This chapter describes in detail the process of implementing a filter by indicating logical design, interface and functionality. It is, therefore, necessary development planned in detail to allow the author to understand each module in more detail in order to progress the work of the implementation process to be orderly and to minimize the time implementer.

CHAPTER 4
RESULTS OF STUDY

4.1 INTRODUCTION

Having obtained the required data and information through the experiments and questionnaires provided and the information obtained orally and through the questionnaire.These data were then analyzed to formulate a conclusion.The statistic obtained illustrates that the "pH Filter IV" materials are suitable for use in premises, laundry and housing to clean laundry water.

This study has been done by testing in some laundry facilities as well as residential areas. ”PH Filter IV was installed in the drainage pipes before it was discharged to the gutters. This facility is monitored by the owners of the laundry premises and the public in the residential area. This study we conducted was an interview on the satisfaction of premises owners and the public about the results after using this filter. In addition, we also conducted an analysis using a google form questionnaire to find out the public's knowledge of water pollution resulting from the premises and the importance of water filtration to help reduce water pollution rates in rivers. The results of this study will be analyzed in three parts as follows:

The study was conducted using 22 public respondents and 3 respondents premises owners. There are several aspects that are the main focus:

1. General opinion of the study
2.Receive owner's opinion on the effectiveness of pH Filter IV products

4.2 ANALYSIS AND FINDING OF DESCRIPTIVE DATA

4.2.1 Demographic Respondents

Diagram 4.1 Population people use laundry

Based on the pie chart, we could see that 92.4% people know how to use self services laundry and use it. We want to make sure that the laundry issue relevant with our project.

Diagram 4.2 Frequency people use laundry

Analyzing how often people use the laundry self services in the area. We can conclude that 46.9% of people use the laundry twice a week. We assume that they used the laundry at the weekend.

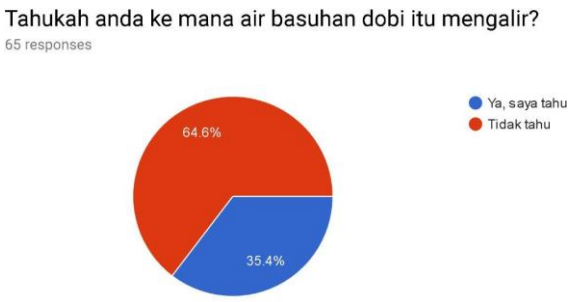


Diagram 4.3 People's awareness and knowledge

It seem like people have less awareness about this issue. Only 35.4% know about this current issue. It could cause disease if the water is not treatment.

The table below shows the average reading of the water pH level at the Sultan Salahuddin Abdul Aziz Shah Polytechnic Self-Laundry. This is the before and after pH level after streamed into pH Filter IV. It shows that it's average around 5.5 - 8.

Reading	pH level	
	Before	After
1	9.14	7.71
2	4.31	7.61
3	5	6.5

The table below shows the average reading of the water pH level at one of residential area, TTDI Apartment. This is the before and after pH level after streamed into pH Filter IV. It shows that it's average around 5.5 - 8.

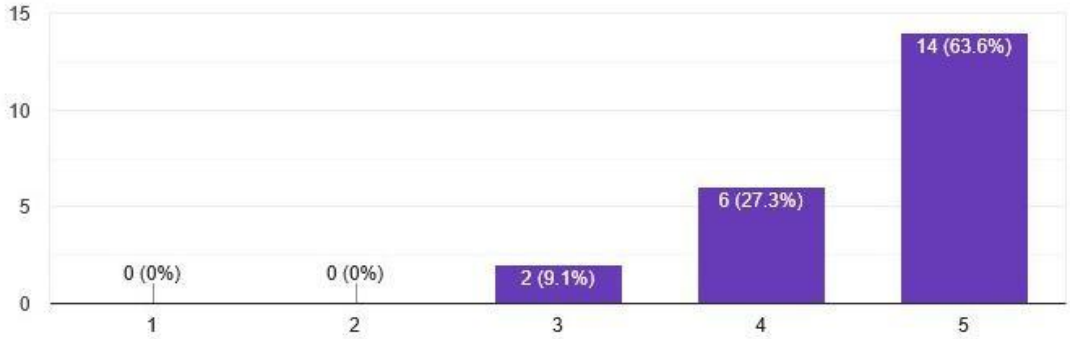
Reading	pH level	
	Before	After
1	4.38	7.73
2	4.31	7.54
3	9.13	5.67

4.2.2 Questionnaire Data Analysis

To further strengthen the research conducted the survey method was conducted using questions and scales from the public and the owners of the laundry premises. The data obtained will be made into graphs to facilitate the information to be analyzed. The following are the relevant questionnaires for pH Filter IV water filter products.

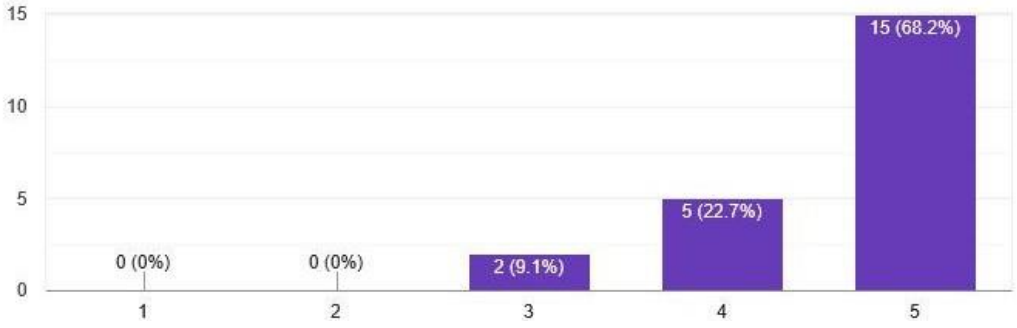
1. Pembuangan air dari premis menyebabkan pencemaran air di sungai.

22 jawapan



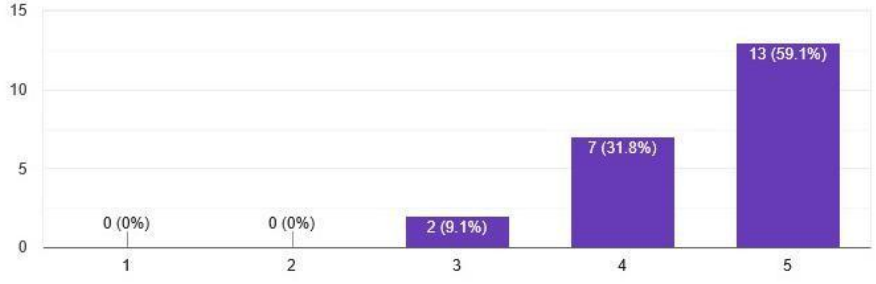
2. pH Filter IV diperlukan untuk membantu mengurangkan indeks pencemaran air

22 jawapan



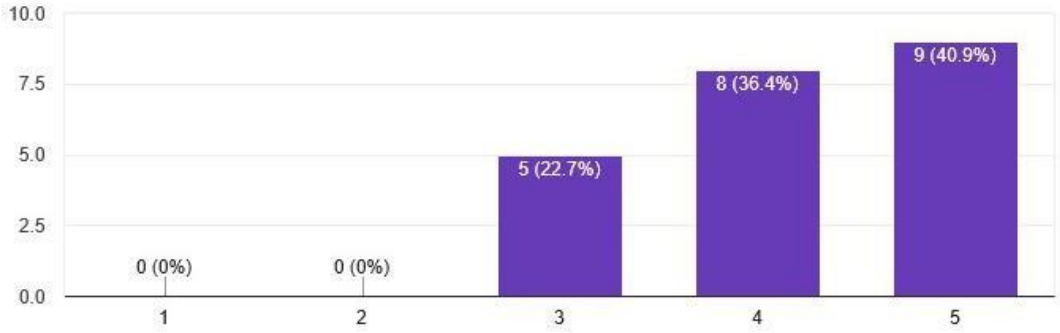
3. Produk ini sesuai untuk digunakan di mana-mana premis selain daripada premis dobi layan diri.

22 jawapan



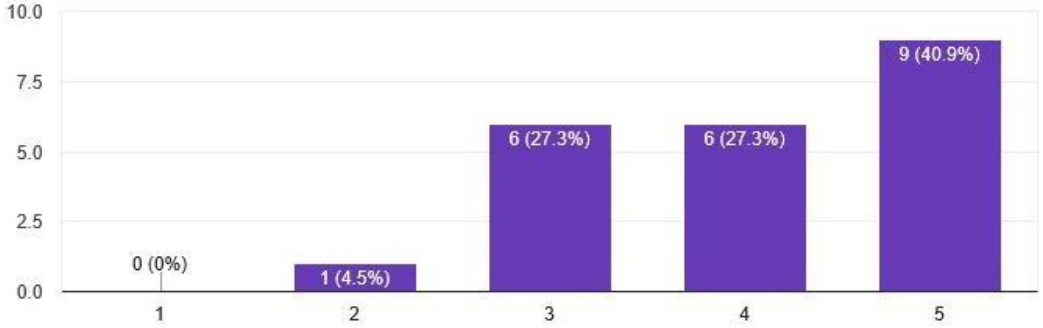
4. Hasil produk ini dapat mengurangkan 30% - 80% pencemaran air.

22 jawapan



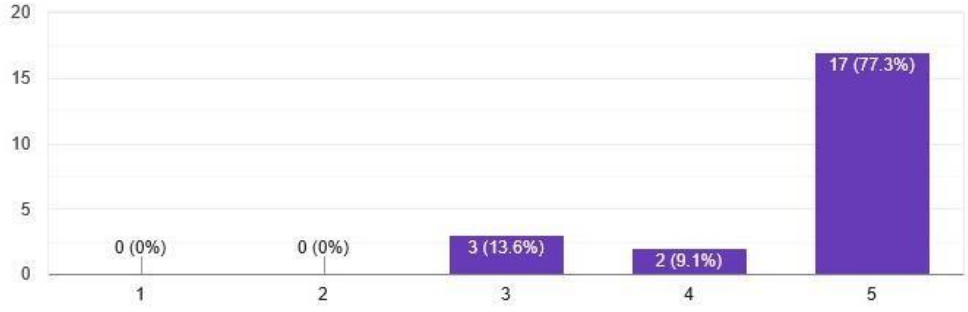
5. Bahan Filter ini mudah diganti dan dipasangkan semula.

22 jawapan



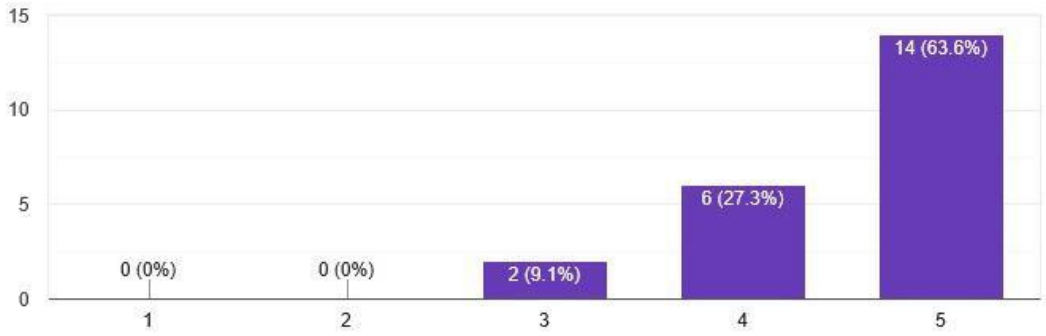
6. Bahan-bahan pH Filter IV adalah semulajadi; (batu tawas, sabut petola, batu sungai, arang)

22 jawapan



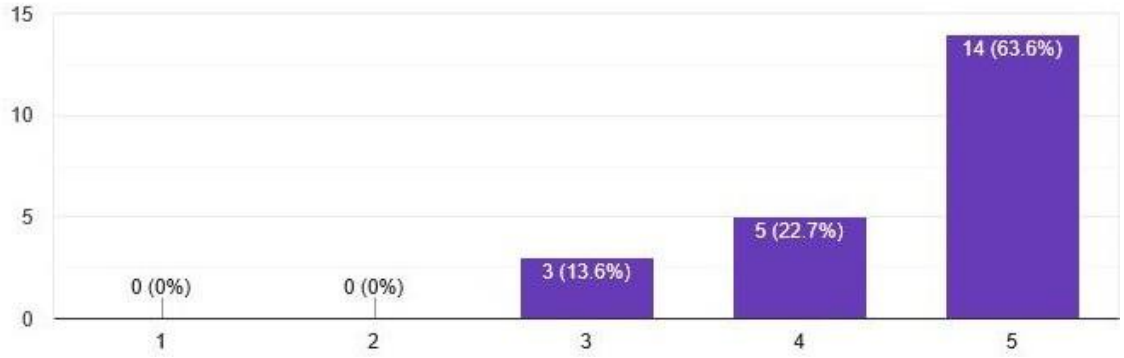
7. Produk ini mampu untuk menukarkan warna air selepas basuhan kepada warna asal.

22 jawapan



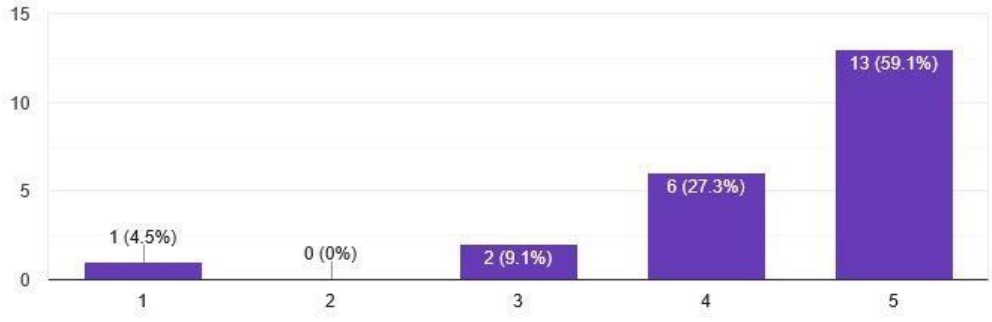
8. Dapat menghilangkan buih-buih sabun

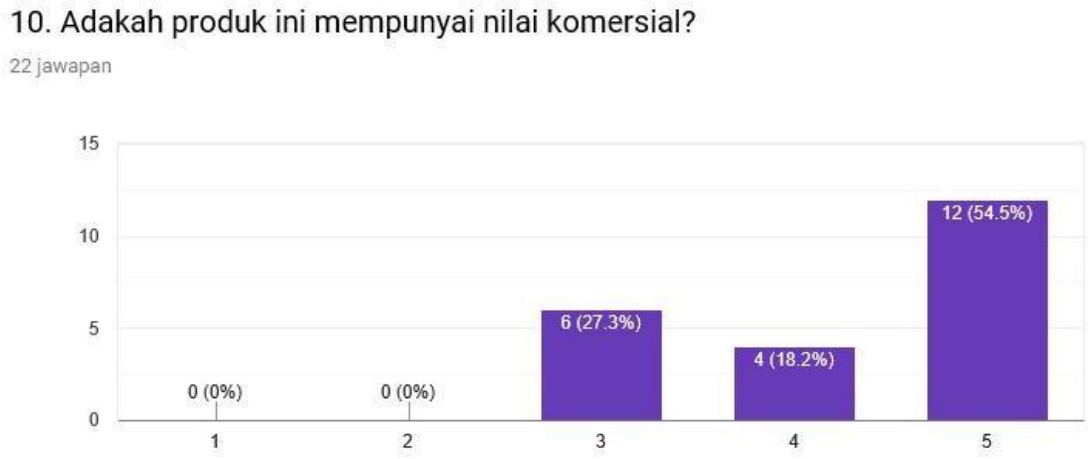
22 jawapan



9. Hasil air yang dialirkan dari pH Filter IV boleh dikitar semula sebagai air tadahan.

22 jawapan





From the questionnaire, we found that 15 out of 22 people strongly agree that pH filter products can help lower the water pollution index by recording the highest percentage. The public also strongly agrees that the results of this product can also reduce the current 30-80 percent water pollution. After presenting our results to the public, 63.6% strongly agree that this product is capable of converting water color after washing to original water color and soap bubbles can be eliminated after being flowed using pH filter.To benefit the public when using our products 59.1% of them strongly agreed that the water from the pH filter could be reused as tap water to be used for floor cleaning, car washing and so on and 4.5% strongly disagree. To formalize our products, 54.5% strongly agree that our products are formalized to ensure the reduction of current water pollution rates.

4.3 ANALYSIS AND FINDING OF EMPIRICAL DATA

For the test run, we have choose two different places to test the water from the washing machine after using our product. We had also explained to our users the purpose and purpose of creating pH Filter IV. Positive responses are received after the owner seeing the test results.We always find that all the objectives have been met. The research objectives are:

i. Lower the pH value of the wash basin according to the pH index (5.5-9) approved by the Department of Environment.
ii. Reduce the odor of citations from the Messenger
iii. Ensure that the laundry water is discharged into the drain according to the Department Of Environmental's quality index of water quality.

Diagram 4.4 DOE Water Quality Index Classification

Water Classes And Uses

CLASS	USES
Class I	Conservation of natural environment. Water Supply I - Practically no treatment necessary. Fishery I - Very sensitive aquatic species.
Class IIA	Water Supply II - Conventional treatment. Fishery II - Sensitive aquatic species.
Class IIB	Recreational use body contact.
Class III	Water Supply III - Extensive treatment required. Fishery III - Common,of economic value and tolerant species;livestock drinking.
Class IV	Irrigation
Class V	None of the above.

Sourse : EQR2006

Diagram 4.5 Water Class and Uses

DOE Water Quality Classification Based On Water Quality Index

SUB INDEX & WATER QUALITY INDEX	INDEX RANGE		
	CLEAN	SLIGHTLY POLLUTED	POLLUTED
Biochemical Oxygen Demand(BOD)	91 - 100	80 - 90	0 - 79
Ammoniacal Nitrogen(NH3-N)	92 - 100	71 - 91	0 - 70
Suspended Solids(SS)	76 - 100	70 - 75	0 - 69
Water Quality Index(WQI)	81 - 100	60 - 80	0 - 59

Sourse : EQR2006

Diagram 4.6 DOE Water Quality Classification Based on Water Quality Index

4.3.1 TESTING AT SELF-SERVICE LAUNDRY;POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

Before use our product.
pH value: 8.47

After use our product.
pH value: 6.48

The colour has change from murky turn into it's natural

Diagram 4.7 Testing at self-service laundry

As a result of testing in the self service laundry, the color of the wash water before being filtered through our filters has been reduced, the odor has been reduced, the quantity of bubbles in the water has also been reduced and the pH of the water has been reduced to 6.48.

4.3.2 TESTING AT RESINDENTIAL AREA

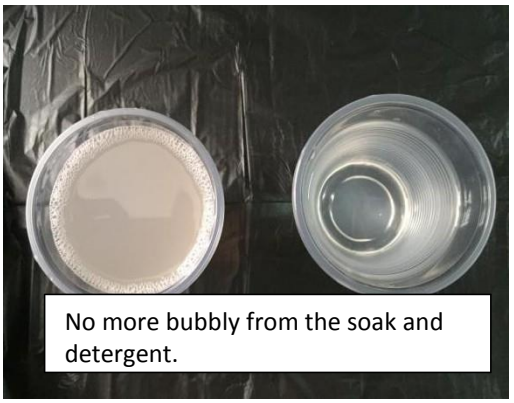


Diagram 4.8 Test result at residential area

As a result of testing in the self service laundry, the color of the wash water before being filtered through our filters has been reduced, the odor has been reduced, the quantity of bubbles in the water has also been reduced and the pH of the water has been reduced to 7.63.

4.4 CONCLUSION

In conclusion, after conducting research and analyzing the results of the descriptive and empirical findings, we find that the production of our products can help reduce current contaminated water levels and control them from becoming worse in the future. The effectiveness of our products has been tested on several premises that contribute to environmental pollution. All of these objectives have also been achieved successfully and this reinforces the effectiveness of our product.

CHAPTER 5
DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

Students have been able to make this product work well in a timely manner. In innovating this product, students have successfully achieved the goals that the student has desired. For example, ensure that the laundry water is discharged into the drain according to the Department of Environment's water quality classification. In addition, this discussion has been conducted from time to time so that students can solve the problems that are being addressed by the group members. Students also often refer to the supervisor to do some project-related work.

In addition, students also make good preparations for presentations. For example, all members of the group will be aware of all types of materials and functions, the Water Quality Index by the Department of Environment as well as the Water pH values allowed by the Department of Environment so that the questions that will be addressed can be answered correctly by the students when asked by the panel on duty. In addition, students will gain knowledge when doing research on this project.

The main function of "pH Filter IV" is a water filter tool that is used to reduce water pollution that results from uncontrolled release of water before discharging into a drain or river. This product has been innovated from existing water filter tools on the market but has been modified for use by washing machines. In addition, our product is a user-friendly product. This product will be placed on the drainage line at the premises, laundry or at home. The presence of this product can reduce the rate of water pollution occurring in the country and also save aquatic life. Advice from supervisors and panels also helped the project succeed. Great ideas also come from supervisors and panels

5.2 DISCUSSION

The following is a discussion of the results of the findings and the problems arising from a survey conducted on the percentage of respondents regarding water pollution that results from uncontrolled washing. Subsequently, data retrieval identifies the problem and how it is solved. The discussions held with our supervisor, Puan Nazrizam Binti Ab Wahab to facilitate our study to achieve the pH Filter IV objective.

Each member of the team also has their own tasks and complement each other to make this project a success.The existing knowledge is also shared so that all members of the group know and learn from each other about the product been innovated. On the whole, commitment and cooperation are essential to carry out every task assigned to us.

5.3 CONCLUSION

Overall, we are very grateful and grateful that this project has been well completed.Various methods have been applied in the process of completing this project. All the time, energy and money have been allocated successfully. We look forward to the innovation of this pH Filter IV product in the community in an effort to reduce future water pollution.

Indirectly, as little as we can learn about managing a project using a gantt chart we can systematically prepare the product. The tolerance and cooperation shown by each team member is key to the success of this project. Hopefully with the advent of this product, it will help humans in controlling the pollution that is happening today.

5.4 RECOMMENDATIONS

Within a given time frame, we successfully completed the project. This product can operate as planned and achieve the objectives as desired and the product has been successfully tested. While this product works, every product owner who has used this filter product is very satisfied. In producing this product we hope it will help to reduce the water pollution that is happening today and also provide comfort to the people living near the laundry premises.Some suggestions we have made to improve the quality of this project.

Generally, this product is a product of planned innovation and achieves a set objective.We also hope that future students can make even more improvements to this product so that it can be a great product and solve many problems.Some suggestions have been submitted for improve the quality of this project. Among them are:

(i) Capacity of pH Filter

Make this filter with larger capacity. So, no need to change materials regurlarly. The limit for all of these materials is once a month.

(ii) Easy-to-find the materials

Find materials that are more easier to find. For example, husk fibre*(sabut petola)* is hard to find in Peninsular Malaysia, but it is easy to find it in Sabah and Sarawak.

5.5 CONCLUSION

At the end of chapter 5, we are very proud of what we have accomplished to build a quality and useful product for the community.Solving a product is very tempting to us.This project has been going well for 11months. We have found that working together is very important for us to do something.Discussions between group members should be held regularly so that each group member can present ideas to improve our project.

In addition, our products can help the community in reducing future water pollution.Our products can also save aquatic life populations.In order to save the environment the user can also save water as the filtered water can be reused for cleaning or car washing. . It can benefit the environment and the community. We are excited to create products that will help save the world.

In addition, sacrifices in terms of time and money have to be made to make this project a success. Students also learn a lot from mistakes when preparing this project in terms of presentation, writing reports and entering data-related information. Patience during this project is extremely important as there may be misunderstandings between members of the group or mistakes made during the completion of the project. Finally, students can gain new experience while completing this project to the extent that they can help students get used to and work under pressure to work in the future.

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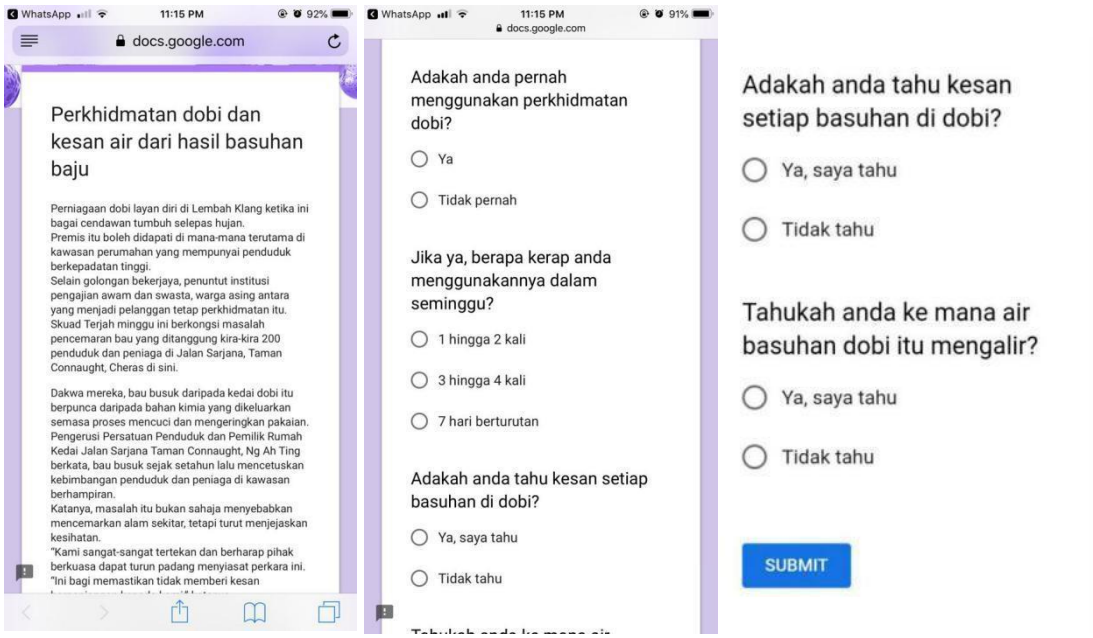
APPENDIX

APPENDIX B



Perkhidmatan dobi dan kesan air dari hasil basuhan baju

Perniagaan dobi layan diri di Lembah Klang ketika ini bagai cendawan tumbuh selepas hujan.
Premis itu boleh didapati di mana-mana terutama di kawasan perumahan yang mempunyai penduduk berkepadatan tinggi.
Selain golongan bekerjaya, penuntut institusi pengajian awam dan swasta, warga asing antara yang menjadi pelanggan tetap perkhidmatan itu.
Skuad Terjah minggu ini berkongsi masalah pencemaran bau yang ditanggung kira-kira 200 penduduk dan peniaga di Jalan Sarjana, Taman Connaught, Cheras di sini.

Dakwa mereka, bau busuk daripada kedai dobi itu berpunca daripada bahan kimia yang dikeluarkan semasa proses mencuci dan mengeringkan pakaian.
Pengerusi Persatuan Penduduk dan Pemilik Rumah Kedai Jalan Sarjana Taman Connaught, Ng Ah Ting berkata, bau busuk sejak setahun lalu mencetuskan kebimbangan penduduk dan peniaga di kawasan berhampiran.
Katanya, masalah itu bukan sahaja menyebabkan mencemarkan alam sekitar, tetapi turut menjejaskan kesihatan.
"Kami sangat-sangat tertekan dan berharap pihak berkuasa dapat turun padang menyiasat perkara ini.
"Ini bagi memastikan tidak memberi kesan

Adakah anda pernah menggunakan perkhidmatan dobi?
- Ya
- Tidak pernah

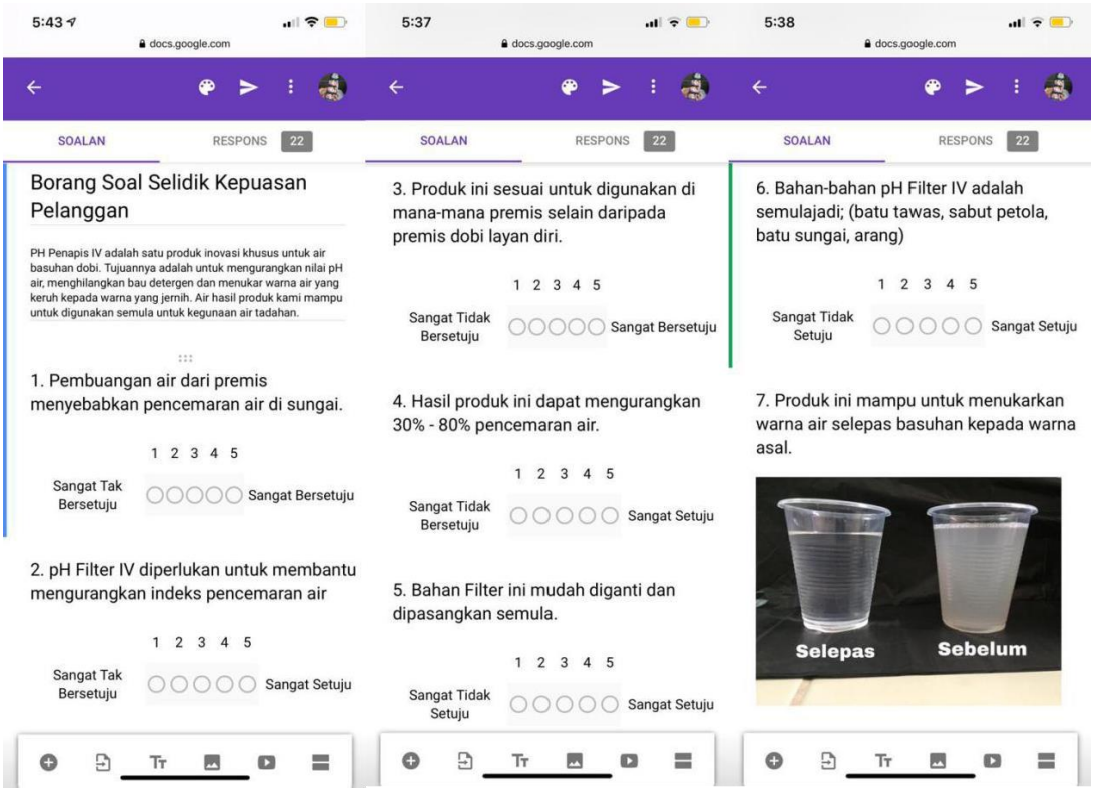
Jika ya, berapa kerap anda menggunakannya dalam seminggu?
- 1 hingga 2 kali
- 3 hingga 4 kali
- 7 hari berturutan

Adakah anda tahu kesan setiap basuhan di dobi?
- Ya, saya tahu
- Tidak tahu

Adakah anda tahu kesan setiap basuhan di dobi?
- Ya, saya tahu
- Tidak tahu

Tahukah anda ke mana air basuhan dobi itu mengalir?
- Ya, saya tahu
- Tidak tahu

SUBMIT



SOALAN | RESPONS 22

Borang Soal Selidik Kepuasan Pelanggan

PH Penapis IV adalah satu produk inovasi khusus untuk air basuhan dobi. Tujuannya adalah untuk mengurangkan nilai pH air, menghilangkan bau detergen dan menukar warna air yang keruh kepada warna yang jernih. Air hasil produk kami mampu untuk digunakan semula untuk kegunaan air tadahan.

1. Pembuangan air dari premis menyebabkan pencemaran air di sungai.

1 2 3 4 5
Sangat Tak Bersetuju ○○○○○ Sangat Bersetuju

2. pH Filter IV diperlukan untuk membantu mengurangkan indeks pencemaran air

1 2 3 4 5
Sangat Tak Bersetuju ○○○○○ Sangat Setuju

3. Produk ini sesuai untuk digunakan di mana-mana premis selain daripada premis dobi layan diri.

1 2 3 4 5
Sangat Tidak Bersetuju ○○○○○ Sangat Bersetuju

4. Hasil produk ini dapat mengurangkan 30% - 80% pencemaran air.

1 2 3 4 5
Sangat Tidak Bersetuju ○○○○○ Sangat Setuju

5. Bahan Filter ini mudah diganti dan dipasangkan semula.

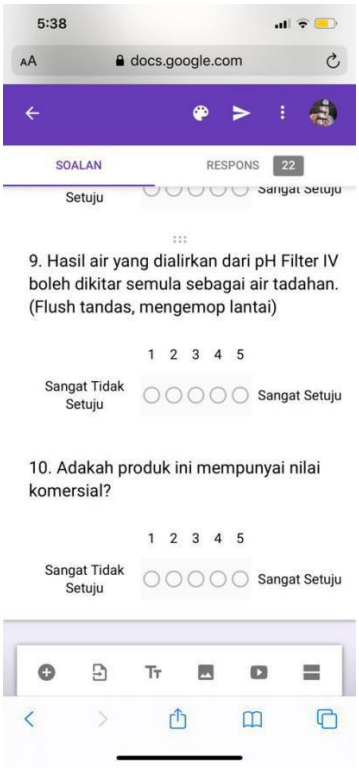
1 2 3 4 5
Sangat Tidak Setuju ○○○○○ Sangat Setuju

6. Bahan-bahan pH Filter IV adalah semulajadi; (batu tawas, sabut petola, batu sungai, arang)

1 2 3 4 5
Sangat Tidak Setuju ○○○○○ Sangat Setuju

7. Produk ini mampu untuk menukarkan warna air selepas basuhan kepada warna asal.


5:38
docs.google.com
SOALAN
RESPONS 22
8. Dapat menghilangkan buih-buih sabun
1 2 3 4 5
Sangat Tidak
Sangat Setuju


5:38
AA
docs.google.com
SOALAN
RESPONS 22
Setuju
9. Hasil air yang dialirkan dari pH Filter IV boleh dikitar semula sebagai air tadahan. (Flush tandas, mengemop lantai)
1 2 3 4 5
Sangat Tidak Setuju
Sangat Setuju
10. Adakah produk ini mempunyai nilai komersial?
1 2 3 4 5
Sangat Tidak Setuju
Sangat Setuju

APPENDIX C

Material, Apparatus And Costing

No	Material	Quantity	Price per unit (RM)	Total (RM)
1	Portable PH Meter	1	24.94	24.94
2	Water Filtration Housing	1	40.00	40.00
3	Water Filter Replacement 10''	2	33.80	67.60
4	Water Filter 1/2'' Tube	1 meter	3.00	3.00
5	Faucet Connector 1/2''	3	6.00	18.00
6	Faucet Connector 6/8''	2	8.00	16.00
7	Alum Stone *(Batu Tawas)*	2 kg	17.52	35.04
8	Charcoal *(Arang)*	500 g	6.00	6.00
9	Husk Fibre *(Sabut Petola)*	1 kg	15.00	15.00
10	River Stone *(Batu Sungai)*	-	-	-
11	Lab Test for *pH water level, odors and colour*	2	80.00	160.00
Total				385.54

APPENDIX D

Component Of Project

Materials that been used in pH Filter IV

Husk fibre*(sabut petola)*

Charcoal*(Arang Batu)*

Alum Stone *(Batu Tawas)*

Rock Stone *(Batu Sungai)*

These are few material that we had tried to use in filter (not suitable)

Biji Asam Jawa

Tea Powder*(Serbuk Teh)*

Silica Sand*(Pasir Silka)*

Peat *(Tanah gambut)*

Collaboration with Multifilter Sdn. Bhd

We went here for 2 weeks on weekend to do the filter's housing

Filter Housing and Filtration

Elbow and PVC Pipe