

## CHAPTER VI

### DATA ANALYSIS AND FINDING

#### 6.1 Introduction

This chapter reported on the research finding for the third objective, which is to evaluate the membrane water treatment from *Fiqh* perspective.

#### 6.2 Issues Arise

Several issues have been identified after the data collection process as follows:

i. The status of produced water by the membrane water treatment process is sourced from *musta<sup>c</sup>mal* and *mutanajjis* water.

Before the treatment, the water source usually comes from contaminated water which mainly from *mutaghayyir* or *mutanajjis* water. For the ablution water, the origin water is usually from *musta<sup>c</sup>mal* water. So, is the membrane treatment process to produce clean water regarded as *mu<sup>t</sup>laq* water?

ii. The sources of filter materials

Most materials used in filter manufacturing are made from bone, as this source is cheap and readily available. So, how about the material for the membrane filter, and is it

permissible from a Shariah perspective? The subsequent discussion will be answered the above questions triggered through the document analysis and interview methods.

### 6.3 Informant Demography/ Context

The interview is done with the *Fiqh* experts and water technologists. These informants are chosen from the academicians and also industry players. The details of the interview informants are as follows:

**Table 6.1:** Interview Informants List

Informants	Expertise Fields
<b>Shariah &amp; Fiqh Experts (Academics)</b>	
Informant 1: Senior Lecturer Faculty of Shariah and Law Universiti Sains Islam Malaysia	a) <i>Fiqh</i> Halal Issues b) <i>Fiqh</i> Consumerism Issues
Informant 2: Associate Professor <i>Fiqh</i> and Usul Department Academy of Islamic Studies Universiti Malaya	a) <i>Fiqh</i> Halal and Haram b) <i>Fiqh</i> Consumerism c) <i>Fiqh</i> Ikhtilaf d) Astronomy (Falak)
Informant 3: Associate Professor/ Head of International Halal Audit International Institute for Halal Research and Training (INHART), IIUM	a) Shariah Law b) <i>Fiqh</i> Halal and Consumerism c) Fundamental and Determination of Halal Haram Products d) Integration <i>Fiqh</i> and Science e) Islamic Cleansing ( <i>sertu</i> ) f) <i>Fiqh</i> Consumerism g) <i>Fiqh al-Istihālah</i> h) <i>Al-Jallālah</i> i) <i>Al-Istitābah</i> j) <i>Al-'Uruf</i> k) Halal Food Culture l) Halal Training and Halal Module Development
<b>Water Membrane Technologies (Academics)</b>	
Informant 4: Lecturer Faculty of Engineering Technology Universiti Tun Hussein Onn Malaysia	a) Membrane Technology in Water Treatment b) Membrane Technology in Gas Operation

Informant 5: Professor/ Advisor Advanced (AMTEC), Malaysia	Membrane Universiti Teknologi	a) Membrane Technology b) Fire Fuel Cell
<b>Water Membrane Industry</b>		
Informant 6: Founder TZ Technology		Water Treatment Membrane Technology in Water Treatment

Source: Researcher (2019)

#### 6.4 Definition of Water Treatment and Purification

Water as the source of creature life is vital and must be adequately preserved. One way to manage the water source is by applying treatment and purification for the contaminated water to be reused.

According to Informant 2, water is classified into *ṭahūr* and *ṭahīr*.

*“..Ṭahūr means pure and can be used to purify in Islam like istinja’, ghasl hadath and so on, and other daily purposes. Ṭahīr refers to the status of the water that is pure but not purified. The other one is ṭahūr. Mustaʿmal water is categorised as ṭahīr. In contrast, ṭahūr means the status of pure and purified water. It can be used for ghasl hadath. It is purification in Islam. Muṭlaq water is categorised as ṭahūr status. So, the purification of water means the water is contaminated or mustaʿmal and mutanajjis water which is undergoing the process of purification or treatment and back to being as ṭahīr. So, taṭhīrul al-ma’ is the process of mutanajjis water to be muṭlaq water..”*

While according to Informant 3, treatment and purification of water refers to purifying the *mustaʿmal* and *mutanajjis* water. When these waters are purified with specific processes, the status of water is changed and effected the purity of water.

*“..when the elements of najāsah in water are eliminated from the mustaʿmal and mutanajjis water with the process, then the water is changed into muṭlaq water..”*

So, water treatment and purification in Islam or *taḥīrul al-māʿ* is treating the used water into *muṭlaq* water for any purposes, including religious purposes. In other words, water reclamation can also be defined as purifying and reusing wastewater (Abdelkadir et al., 2015). Purification of water included *ṭahīr* and *ṭahūr* water. *Ṭahīr* water is different from *ṭahūr* water, which is pure and not considered defiled by *najāsah* but is not purifying. A person cannot use it for religious purification.

## **6.5 Water Treatment and Purification Methods**

When the water is contaminated with *najāsah*, it should be purified to ensure it is *muṭlaq* and can be used for worship. According to Informant 1,

*“..Fuqaha mention no specific method in the Fiqh thurath books, which meant that it depends on the scientific methods to purify and treat the mutanajjis or contaminated water..because, in Fiqh, it is not mention detailed about the method of purifying the water, but only mention about the status of water. So, we can use whatever methods as long as the method can eliminate the three criteria of water (odour, taste and colour). Then, it is regarded as the purification of water in Islam..”*

One specific method to purify the contaminated water whether *musta' mal* and *mutanajjis* water is adding a large quantity of water into the water. For example, the contaminated water in an opened container and rain showered the container. So, the contaminated water turns into *muṭḥaq* water because the water is added with a large of water from the rain (*muṭḥaq* water).

Informant 3 also agreed with Informant 1, whereas the method of water purification is by eliminating the three indicators of *najāsah*; odour, taste and colour. So, technology nowadays needs to eliminate these three indicators of *najāsah* to ensure water purification into *muṭḥaq* water. One of the views is to flow out the water in the tank, which is more than two *qullah* in size and is suitable for purification, and if the water is pure, then it will change to *muṭḥaq* water. So, the purification of water in Islam means eliminating the odour, taste and colour of *najāsah* from the water. This elimination can be done by various methods, especially with modern technology. This specification is applicable for doing worship.

Islam offers a wide alternative or methods to purify the water with the principle of odour, taste and colour of *najāsah* in water cleaned. There are varieties of methods suggested by the researcher to treat and purify the water, such as adding the water, the water condition change naturally, and impure water washed by soil (Al-Shiraziyy, 1996), *ṭarīqah al-nazh* which is draining the impure water and leaving clean water without any change by closing the fountain (water source), disposing of the things causing the water impure and then eliminate the taste, colour and smell that caused the changes of water, *ṭarīqah al-mukatharah* which is adding *muṭḥaq* water into the impure water to eliminate all the *najāsah* and everything that makes the water changed and *ṭarīqah al-taghyīr* which is

changing the impure water with different traits so that the characteristics of the water return to their original state or named as *istihālah* (Majelis Ulama Indonesia, 2010).

## 6.6 Membrane Water Treatment

Membrane water treatment is one of the technologies used to filter and produce clean and pure water. Its function is to eliminate the unwanted substances and contaminants in water for certain substances depending on the membrane's pores (Le & Nunes, 2016). In line with that, the definition of membrane water treatment also has been expressed by informants that consist of experts in water technologies and academicians. According to Informant 5, a membrane in water treatment is a layer with pore sizes that depend on the membrane types. For example, the smallest pore size, called reverse osmosis, only allows water to pass through but rejects other molecules. The membrane is used to separate a material and is selective against a material and will separate the material it does not select.

While Informant 4 also has the exact definition, which defines the membrane treatment according to the pore's size.

*“..basically there are four types of the membrane in the water treatment context and their pore sizes define it..pore size of the membrane..the bigger pore size is called microfiltration, which is less than 100 nanometers. Then ultrafiltration and nanofiltration are in the range of 1 to 2 nanometers, and the smallest pore size is reverse osmosis. So, we can conclude that this membrane in water treatment is classified according to the pore size of each membrane ..”*

Then, Informant 6 said that membrane in water treatment is the process in which when water is released into pipes and at a determined pressure, so the foreign and soluble

substance is discharged from the liquid and changed into a solid. So, when the contaminant in water turns solid, it cannot pass through the filter; only pure water can pass through the filter to produce clean water.

*“...we can say that the function of the membrane is not only to filter the water but actually to change the water characteristics because the membrane process uses pressure technique. In the pressure technique, the substances in water will spin and separate. So, this process will cause the unwanted substances to be removed by filtering in membrane water treatment...”*

So, informant 6 has described how the membrane functions to eliminate and filter the contaminants in water.

## **6.7 Main Components and Functions of Membrane Technology**

Membrane water treatment consists of several components to complete and support the membrane process in water treatment. According to Informant 5, the components and function of membrane technology depend on the membrane's application. The membrane can be used in the industrial sector to treat the waste contained in water. So, the contaminants are first eliminated from water to discharge the less contaminant water to the rivers or drains. Another membrane's use is for producing drinking water which will use smaller pores to filter the contaminants to produce drinking water. As said by Informant 5:

*“...Usually, for wastewater treatment from industrial waste, the treatment is aimed not at producing drinking water. So, water treatment is done to safely save and*

*discharge it to the environment. Industrial wastewater treatment is usually done by pre-treatment first. Then we have the membrane that we use either microfiltration or ultrafiltration processes. But if the water is treated aiming to produce for drinking, then the membrane used should have different pore sizes. There is a need to use either nanofiltration or reverse osmosis because this nanofiltration and reverse osmosis have smaller pore sizes and could reject or even remove all the conditions in the water. So the water produced is quality water suitable for drinking. There is no mineral in the water after this process; usually, the pre-treatment is sedimentation or sand filter..”*

So, using different membrane types with assorted pore sizes is crucial for effectively functioning the membrane process in filtering unwanted substances and molecules in water. While Informant 4 said that the main component of the membrane is the membrane itself. The membrane has no hazardous chemicals used and it has hollow fibre and a flat sheet in design. For nanofiltration and reverse osmosis, used flat sheets for commercialization and microfiltration and ultrafiltration used hollow fibre.

*“..the component in the membrane is the membrane itself..besides the engineering parts to allow the water flowing and the setting of the membrane water filter..“*

Two designs of membrane components are used in the membrane: flat sheet and hollow fibre. This design is used also depends on the application of the membrane. Flat sheet or hollow fibre, both designs will be rolled when it is set up in a membrane filter.

*“..the design of membrane components are flat sheet and hollow fibre..flat sheet is like paper. It has flat in shape..”*

The types of applications of membranes will use different membrane designs for the effectiveness of the treatment process. The nanofiltration and reverse osmosis types of membrane usually use flat sheet design. Then, microfiltration and ultrafiltration used hollow fibre.

*“..So basically, the membrane has hollow fibre and flat sheet designs..two designs..usually, for nanofiltration and reverse osmosis, especially for commercial use, the suitable design is flat sheets. Then, if microfiltration or ultrafiltration, it will use a hollow fibre design.. So you will see those kinds of fibres in membrane filter...”*

So, the application of membrane needs to be suited to the membrane design, whether hollow fibre or flat sheet design.

Next, Informant 6 also said that the components in the membrane are divided into several parts. The parts included a pre-treatment process that used traditional treatment to support the membrane treatment process. Pre-treatment usually used in the membrane treatment product by informant 6 is ultraviolet to kill the bacteria and sand as the filter to dispose and filter the unwanted substances. This setting is also called a membrane plan as the whole concept.

*“..There must be a pipe, and the membrane must have a pump and ultraviolet to kill the bacteria..filter sand to dispose of the residue ... will block and filter any unnecessary things from entering the membrane. Filter the part first, then go to the membrane. This is called a membrane plan. The vertical one is the membrane, and the two standing sticks are the filters. I took the river water as raw water...The river*

*water is pumped up to the filter..the filter will eliminate the rough and big residues. Then, the fine substances go inside the membrane. Then, the water goes down to the diffusion and can be drunk. This process has sequence and order. So, this part is for the membrane that I have invented..”*

So, it can be concluded that the membrane process usually needs another pre-treatment process to ensure filtration effectiveness. The contaminants in water nowadays are complicated and can be categorized as organic, inorganic, and biological and radiological (Sharma & Bhattacharya, 2017). So, with the support of other treatments, the membrane process can function optimally.

#### **6.8 Materials of Membrane Water Treatment**

The water treatment materials are made up of ceramic, polymers or fibre that can be simplified as organic and inorganic materials. All the materials for water filter production need to be notified for the *hukm* of halal or haram of the sources.

According to Informant 2, all the processes and materials must follow Shariah compliance.

*“..if the material and operation principle is complying with Shariah from the aspects of water filter material sources, the source of water, end products or water produced by the filter..if all these aspects comply with Shariah principle, then it’s ok. This means all of these need to be included in the authorised Fiqh framework. Then, it will produce pure water without criteria of najāsah..”*

Informant 1 also responded that chemical material used in water treatment also needs to be noticed as the chemical material added into the water can affect the water's nature and criteria.

*“..besides of the materials for the filter, there are also included the chemical materials for changing the contaminated water into clean water.. is the chlorine is same with tuhlak?..like soil water..we can use soil water..but the chlorine is the mixture material that can be affected the nature of mutlaq water..we all used chlorine water right now..so that means, the used of chemical water in water treatment is permissible in reality..”*

According to Sagle and Freeman (2004), water treatment material focuses on the membrane. The water filter material can be divided into organic and inorganic materials. While Ladewig and Al-Shaeli (2017) mention three types of materials used in the membrane's manufacturing: organic materials, inorganic materials and biological materials. With advanced studies and technologies, membrane materials can also be found using nanomaterials in membrane filters (Sushma & Sharma, 2015). These nanoparticles in water treatment enhance the membrane filtration process. So, the informants later explain the basic membrane materials that are usually used in the membrane filter.

Informant 4 said that membrane is made up of polymer or ceramic. All the membrane materials are mostly made up of polymer, but the difference is only in the fabrication of the polymer. The types of application of membranes use different types of polymers that are determined in the fabrication process. The fabrication involves forming membranes in different arrangements to meet different demands (Ladewig and Al-Shaeli,

2017). Most microfiltration, ultrafiltration, nanofiltration and reverse osmosis membranes are synthetic polymers (Sagle & Freeman, 2004).

Microfiltration and ultrafiltration types of membranes are usually made up of the same materials but in different fabrication processes so that the polymers produce are different. Usually, microfiltration and ultrafiltration membranes use poly (vinylidene fluoride), polysulfone, poly(acrylonitrile) and poly(acrylonitrile)-poly(vinyl chloride) copolymers . Poly (ether sulfone) is also commonly used for ultrafiltration membrane and microfiltration usually used cellulose acetate-cellulose nitrate blends, nylons and poly(tetrafluoroethylene) materials (Baker, 2004). As stated by Informant 4:

*“..the material of the membrane is from polymer. Usually, the polymer is used in the material of the membrane, but there are differences in the fabrication of the polymer..fabrication is done during the preparation of the polymer. We will use the difference of polymer depending on the application of the membrane. The most membrane used in industries for a commercial is made up of polymers..”*

While reverse osmosis and nanofiltration usually use almost the same materials, these two types of the membrane have smaller pore sizes than ultrafiltration and microfiltration membranes. The reverse osmosis membrane is usually composed of cellulose acetate or polysulfone coated with aromatic polyamides. Nanofiltration membrane used materials consist of cellulose acetate blends or polyamide composites like the reverse osmosis membranes, or both could be modified forms of ultrafiltration membrane such as sulfonated polysulfone (Nunes & Peinemann, 2001).

Next, ceramic as the inorganic membrane material is also used in membrane manufacturing. Inorganic materials consist of glass membranes, ceramic membranes, metallic membranes and carbon membranes.

But, for this membrane water treatment, the most materials used in membrane manufacturing for inorganic materials is the ceramic membrane which has two categorised of ceramic; high-cost ceramic materials such as aluminium oxide, titanium oxide, and zirconium dioxide and low-cost ceramic materials such as powder like clay, dolomite, apatite, fly ash, natural raw clay and kaolin (China clay) (Siti Khadijah, 2015). Ceramic material is also used in membrane filter manufacturing, especially for microfiltration applications (Baker, 2004) but is more expensive than polymers. As stated by Informant 4:

*“..ceramic is more expensive than polymer..”*

Then, the latest and advanced membrane technology found nanomaterials suitable for the membrane filtration process.

*“..in the last two decades, nanoparticles have been in part as the membrane materials during the membrane preparation. When the nanoparticles such as silica are used as the materials, the function is to eliminate the bacteria. The antibacterial function will enhance the membrane’s performance..”*

Based on the information by Informant 4, it can be seen the latest technology in membranes slowly reduced the use of traditional water treatment. For example, the antibacterial function before this is used by adapting the ultraviolet process in the treatment process as the support and pre-treatment for the membrane plan. But now, with nanoparticles such as silica, the membrane filter can remove bacteria in water.

Next, according to Informant 5, there are two categories of the membrane: organic and inorganic. Organic membranes usually use polymer materials, and inorganic membranes use ceramic, metal or carbon materials.

*“...membrane consists of two categories which are organic and inorganic membranes. Organic membranes are made up of polymers; the polymers used are poly(vinyl chloride), polysulfone, and so on. The inorganic membrane can be classified into three types: metal membrane, carbon membrane and ceramic membrane. Usually, polyidium material is used for metal membranes. Next, for the carbon membrane, the material used is a polymer; after pre-treatment, it will change into a carbon membrane. Then, a carbon membrane is produced. While the ceramic membrane is made up of materials such as Albina, zirconia, silica, clay and so on..”*

While according to Informant 6, the materials used for membrane water treatment is from wool or fibre.

*“..wool or fibre is up to you.. Sometimes, it is made up of kenaf tree. It is like fibre, but to use it, it needs to convert into shaping first or can roll it up ... sent to Japan for the roll-out process. The source of fibre from kenaf in Malaysia only costs RM15.00 for 1kg..but I bought it from Germany for RM220.00 per 1kg after changed into cellulose.. and can used for filter materials..”*

Informant 6 also used natural materials for membrane invention for his company.

*“..membrane that I invented or existed in market divided into hollow fibre..I used organic fibre and not plastic fibre..means I use natural materials which is from trees or plants. Fibre from kenaf tree..I also used cellulose or lime. Cellulose has its function to exile the oil from water. So, the membrane component is usually made up of wool or fibre. Fibre from the kenaf tree..this fibre leaf from the kenaf tree must first convert into shaping. So that it is easy to use and rolled it..”*

So, it can be seen that Informant 6, an industrial player involved in membrane manufacturing, used inorganic materials from cellulose from the fibre of the kenaf tree.

#### **6.9 Process and Operation of Membrane Water Treatment**

There are various water treatment processes nowadays as technologies are constantly expanding. So, water technology is also significantly advanced from day to day. According to Informant 1, the water treatment process from the *Fiqh* perspective mentioned by the fuqaha is general, and no specific and detailed guidelines were given to purify the water.

*“..in Fiqh, it is only general and not details..only as a guideline..for example, we need to use muṭṭlaq water..then, the muṭṭlaq water is defined and what are the types of muṭṭlaq water..then, the mustaḥmal water is also defined..mutanajjis water..water that is makruh to be used..there are categories of water. With that, contemporary research can be related to the three natures of water..that all we can be improve the general guideline given by the fuqaha..for example, the quantity of 2 qullah is*

*estimated as 270L in today measurement..or the alternative materials that can be used as the alternative for syubhah materials..”*

The process of membrane typically has no electricity required. But, according to Zirehpour and Ahmad (2016), membranes are the selective barriers that separate two different phases and allow the passage of specific components and the retention of others. Based on this explanation, the movement between the phases or layers is triggered by the driving force. This driving force is needed for transport in membrane processes, and it can be a pressure gradient and chemical or electrical potential across the membrane layers (Zirehpour and Ahmad, 2016).

According to Informant 5, the process and operation of membrane water treatment depend on the membranes' application. There are four types of applications of membrane; ultrafiltration, microfiltration, reverse osmosis and nanofiltration. All types of membranes have different pore sizes that allow and block specific molecules. So, the filtration process of the water in the membrane process depends on the membrane's types.

*“..So, basically, the membrane is categorized into four types or applications: microfiltration, ultrafiltration, nanofiltration and reverse osmosis. The difference between these types is their pore sizes. Reverse osmosis has the smallest pore size. This type can reject all molecules in water such as suspended solids, bacteria and viruses and monovalent ions, such as magnesium and chlorine. So, reverse osmosis type of membrane treatment is used to produce drinking water from seawater as this type will filter and reject all types of molecules and ions including salt..”*

Thus, Informant 6 said the function of the membrane is to change the water's nature and characteristics and not only to filter the unwanted molecules.

*“..but, the membrane is created not for filtering the water, it was created to change the nature or characteristic of the water because membrane technology functioned to press the water and go through the process of pressure, rotation and separation. In those three processes, that's how the membrane functions...”*

So, according to Informant 6, how membrane in water treatment works is by making this application:

*“..Membrane is a process in which when water is allowed into certain pipes, and at certain pressures, foreign matter or soluble substances are discharged and turned into solid. So that the filter inside the membrane filters the solid, and the screen inside the membrane will be blocked and filter the soluble substances in solid nature. Hence, the water that comes out is automatically separated by the pressure pumped from the membrane filtration. This process produced clean water. The blocked substances in the membrane screen can be cleaned by a backwash process..like online cleaning. So, this natural process in membrane no longer requires chemical substances because the foreign substances in water are segregated through the nature of water, which is water solubility...”*

Membrane water treatment has always been studied and adapted for advanced technologies and findings to improve the membrane operation and limit the obstacles that reduce the membrane performance for the membrane application process.

## 6.10 Consumers' Acceptance towards Water Treatment Usage

Typically, the 'treated water' word gives a negative impact and a 'yuck' factor among the people. The acceptance of consumers toward the treated water can be seen through several studies that recent researchers have done. The acceptance of treated water for domestic uses focusing on treating stormwater for drinking and non-drinking purposes showed a significant but considerably less influential factor in public acceptance. It is due to the difference in norms, beliefs and values about the appropriate water use and conservation of water. But, the overall result showed that fewer people were reluctant and guilty of using treated water for potable purposes (Mankad et al., 2019).

They prefer to appreciate and conserve water to avoid using treated water. Next, consumer acceptance towards treated water usage also has been done in Turkey showed that most consumers avoid and are reluctant to use treated water for domestic use, especially for drinking purposes (Buyukkamaci & Sena Alkan, 2013). The people in Kuwait also refuse to consume the treated water, especially for domestic uses, health reasons, psychological reasons, religious beliefs, and so on (Alhumoud & David, 2010). All these studies focus on the domestic use of treated water.

Next, with the findings in the recent studies by other researchers, the information the informants gave through the interview method will also be seen. According to Informant 2, the awareness of consumers of water in Malaysia who mostly use Shafie *madhhab* are reasonably concerned about water usage and its status. The people's consciousness generally exists as they are taught about the concept of *fardu 'ain* and *fardu*

*kifāyah*, focusing on the use of water related to *tahārah* issues. Therefore, the awareness of consumers in Malaysia toward water purification and its *hukm* is high.

*“...consumer’s awareness which is majority applied Shafie madhhab are, concern about the water purification and the water status..we can see from the media that Malaysians are more concerned about the water nowadays as they have learned about the fardhu ain and fardhu kifayah..about the application of water in eliminating the najāsah and for hadath used..Islam also has been widely spread, and people understand Islam. So, generally, they are conscious about water treatment and purification..”*

But, according to Informant 3, consumers in Malaysia are easy to access the water as Malaysia have many bodies that control water management. So, these bodies managed all the water management, including the treatment and distribution of water. Some consumers have never heard or known about water treatment and purification or membrane water treatment technology.

While informant 5 also gives his opinion that the water treatment sector in Malaysia is divided into two sectors; household and industrial. Household use refers to indoor and outdoor water filters, usually on a small scale. The awareness of consumers toward water filters for water treatment is good and has a high demand in Malaysia. But, in the industrial sector, the acceptance and usage of membrane water filters are low. Industrial preferred conventional water treatment over membrane water treatment for the cost factor.

From the aspect of using membrane water treatment as the method for treating the water, according to Informant 4, the acceptance among consumers in Malaysia can be

found in the company or industrial uses. It is a must for companies to ensure the effluent produced is discharged to the environment in a safe condition. Typically, companies use membrane treatment to treat the wastage or effluent produced from their product before it is discharged into the environment especially drains and rivers.

*“..the water discharge or effluent by companies must be treated first before discharge into drain or river. The companies must fulfil the EOD standard for effluent discharge..so they usually use membrane filtration to treat the water..”*

According to Informant 5, the usage of membrane water treatment can be divided into domestic and industrial use. The acceptance of household consumers towards membrane water treatment can be seen in the demands of house filters to filter the water for drinking purposes and other domestic daily life purposes.

*“..the sector for water treatment can be divided into two..the first is the household sector. This is more to house filter..drinking water produced in the house..I can see the demand from the household sector towards membrane filters is good because when this membrane treatment system or filter is highly demanded in Malaysia, the price is low. Then, the service and maintenance for the membrane filter are also provided to make the people happy to use it. So, the acceptance of consumers in Malaysia is good..”*

But, the use of membrane filters for the industrial sector is not in high demand for domestic purposes as the companies prefer to use conventional water treatment rather than membrane water treatment for the high cost.

*“..but if we talk about the industrial sector, there is still less for the membrane technology used because the industrial sector in Malaysia is still less for the application of membrane treatment technology. They still prefer to use conventional water treatment technology rather than membrane treatment technology of the costing reason which is high. “*

This is also supported by Informant 6, which agreed that the acceptance of membrane water treatment in Malaysia is suitable for domestic and industrial usage.

*“..Good..last year (2018), I installed 12 membrane plan filters..they liked it because it is low cost. They want clean water as a necessity in life. My target market is not for urban and rich consumers only, but I focus on the rural consumers such as villages, forests, farms and so on..they also want clean water..”*

Informant 6 can serve and provide a low-cost membrane filter plan because he completely did all parts of the membrane plan and parts by himself. So, from that, he can cut the cost and help others by selling the membrane filter at a low cost and being able to own by all consumers.

*“..when discussing the price, people always say that membrane is expensive..but not for my product as all the parts in the membrane plan used my materials and equipment. I did not buy the material from China, but I made and installed by myself..”*

So, the membrane filter can be owned by all consumers in pursuing clean and pure water.

## 6.11 The Products that Use Membrane Technology

The membrane technology is widely used, focusing on water treatment as the filter to produce clean water available in various products, whether on a small or big scale. Informant 5 gives an example of membrane technology in various filter products.

*“..yes, all the products like Cuckoo and Coway filters that are usually used in the house for drinking purpose have membrane technology..usually cuckoo and coway used in the household sector apply reverse osmosis or nanofiltration membranes..”*

While Informant 6 said that membrane technology in water treatment could be found in a vending machine for water drinking, but the membrane is used on a small scale.

*“..in the water machine, 20 cents have membrane system but is small scale only. But for my product, I usually install in a big scale plant like in the village, forest, chicken factory and so on..”*

So, consumers widely use membrane filters, whether for domestic or industrial uses.

## 6.12 *Hukm* of Membrane Water Treatment

The *hukm* or status raised from the use of the treated water from the membrane water treatment can be viewed from several authorized sources as follows:

### 6.12.1 Water Produced by Water Filter

The *hukm*, status and *fatwa* on utilization of recycled water or treated water are stated and gazetted or not gazetted as follows in several *fatwa*:

- a) Muzakarah of the National Council's Committee (*Muzakarah Jawatankuasa Fatwa Majlis Kebangsaan*) on the 53<sup>rd</sup> time conference on 27 November 2002 has been issued that the consumption of NEWater is permitted as it is clean and permissible (*harus*) to use from the point of view of Islamic law (JAKIM, 2015).
- b) Fatwa issued by Arab Saudi in 1993 mentions that treated water with no smell, taste or colour is considered *muṭlaq* water which is pure and can purify others. So, this water can be used for religious purposes (Ahmad Zaharuddin, 2004).
- c) Fatwa convened by Majlis Ulama Indonesia (MUI), mentions the permission (*harus*) on the utilization of treated water or recycled water (*Majelis Ulama Indonesia*, 2010). The Indonesian Ulama' Council (MUI) (2010) also issued a fatwa on recycled or treated water. Recycled water means treated water basically by using technology from water that has been used (*musta'mal*), contaminated water (*mutanajjis*) or that has changed one of its properties, namely taste, colour and smell (*mutaghayyir*) so that it can be reused after processed. In simple words, this recycled water is called treated water. The *hukm* of treated water is pure and purifying (*ṭahīr mutahhīr*) as long as it is processed accordingly with the methods of *Fiqh*, which is based on one of the three methods given:
- i. The first method is *ṭarīqat al-nazh*, which is by draining or filtering the water that is contaminated with *najāsah* (*mutanajjis* water) or that has

changed its nature (*mutaghayyir* water) so that what remains in water is pure water and not changed one of its properties.

- ii. The second method is *ṭarīqah al-mukatharah*, which is by adding *muṭlaq* water (*tahir muṭahhir*) to water that is contaminated with *najāsah* (*mutanajjis*) or that has changed (*mutaghayyir*) to reach at least two (2) *qullah* as well as the element of *najāsah* and all properties which caused the water to change will disappear.
- iii. The third method is the *ṭarīqah al-taghyīr*, which is by changing the water that is contaminated with *najāsah* or who have changed its nature by using aids (*muṭahhirāt*) that can restore the original properties of the *muṭlaq* water (*tahīr muṭahhir*) with the condition that the water needs to be more than two (2) *qullah* and the aids (*muṭahhirat*) used must be pure and clean.

The MUI states that treated water can be used for ablution, bathing, purifying *najāsah* and *istinja'*, drinking, and used for cooking and other purposes as long as it does not endanger health.

- d) Fatwa from Darul Iftaa, USA, by Mufti Ebrahim Desai, also mentions the permission to the utilization of sewage water (Ahmad Zaharuddin, 2004):

*“..The sewage is transported to the treatment plant through pipes and pump stations. In other words, there is a flow of pure and impure water. If this flowing water in the pipes has no traces of impurity like no change in colour, smell or taste, the water will be tahir or pure. But, if the sewage water has traces of*

*impurity in its colour, taste or smell, it may proceed to recycle wastewater treatment process..”.*

According to the Fatwa of the Council of Great Scholars of the Kingdom of Saudi Arabia, used water has gone through the recycled process, is free from smell, taste and colour, and is considered *mutlaq* water, i.e. pure and purified. The argument is that a lot of water contaminated with *najāsah* becomes pure when the water changes naturally or by putting or adding clean water into it or the water changed naturally due to its exposure or being affected by sunlight or wind. By that, the water is considered pure after being treated. This water can be used to purify *hadath*, cleanse the dirt and legitimately purify with it. However, if other water can be used, then priority is given to the other water (Ahmad Zaharuddin, 2004).

- e. The 100th Federal Territory Islamic Law Consultative Committee Meeting, which convened on 27 February 2017, has decided based on the water purification method implemented by Indah Water Konsortium Sdn. Bhd. to produce biosolids from the Sewage Treatment Plant, the Federal Territories Islamic Law Consultative Committee believes that the infrastructure system that drains the sewage can make the sewage pure and purify (*mutlaq* water) because the occurrence of a process of change to remove faeces and restore the original nature of the pure yet purifying water. Thus, the water can be used for irrigation, and even it can be used for drinking because the water has returned to its original nature of water.

e) Fatwa from (Majlis Ulama Singapura, 2014) also stated that the water could be purified by removing the *najāsah* (impurities) from the water. According to the Fatwa Committee of the Islamic Religious Council of Singapore in a *fatwa* dated 22 May 2001, water that has been treated by distillation is considered *pure muṭlaq water*. This means NEWater is pure and clean and considered *muṭlaq water* pure and purifying. This is based on some views: First, Sheikh Abdul Rahman Abdul Khalik stated that substances (molecules) of water are forever clean. This means that the contaminated water will not dissolve with the *najāsah* but will turn into *mutanajjis* water because it carries *najāsah* only and is not mixed with it. When this contaminated water is treated, then the water becomes pure and purifies. Second, Imam al-Nawāwiyy, in the book of *al-Majmū'* states that the method of removing *najāsah* from the contaminated water, which is less than two (2) *qullah* in quantity by a change in their own (naturally), i.e. by change of time, sun or wind blowing, changes with the addition of water upon it or changes with removing the *najāsah* from the water. Therefore, the Singapore government plans that the water that has been processed will be mixed first in a large water pool before distributed to public use is following the Shariah. Thus, *muṭlaq water* is used (Majlis Ulama Singapura, 2014).

f) Fatwa by the Council of Leading Islamic Scholars (CLIS) in Saudi Arabia concluded in a special fatwa in 1978 that treated wastewater can theoretically be used even for *wuḍū'* and drinking, provided that it presents no health risk (CLIS

1978). The fatwa issued by the Saudi House of Fatwa (CLIS, 1978) regarding wastewater treatment is as follows:

*“According to the report set by the experts in this regard, a large amount of water would be deemed pure from any impurity if the impurity is removed, if more water is added to it, or if the impurity is eliminated by the passing of time, the sun, the wind, or any other cause that would remove it.*

Based on the fatwa and status of treated water issued above, all the authorized sources and selected certain countries permitted and agreed to use the treated water with certain conditions to ensure the water is returned to *mutlaq* water.

Based on the 1978 fatwa, wastewater reuse in Saudi Arabia expanded greatly. In 1995, the kingdom reused about 15 per cent of its treated wastewater for irrigating date palms and fodder, such as alfalfa. Moreover, ablution water at the holy mosques in Mecca and Medina is recycled for toilet flushing, thus conserving expensive desalinated sea water (Faruqi, Naser et al., 2001). Impure water can be purified by using modern filtering techniques that are the best and most efficient methods for purifying water. Many additives are put in impure water to remove impurities, as attested to by water treatment experts. Therefore, the council believes that such water would be completely pure and it may be used for ritual purification and drinking as long as there are no negative consequences on people’s health. The council also recommends avoiding using treated water for drinking purposes to avoid health problems and also in consideration of the negative public sentiment about this water. However, using this water to irrigate crops or park areas is permissible.

While according to Central Highland Water, as mentioned by Ebrahim Desai (Ahmad Zaharuddin, 2004), sewage is defined as wastewater from shower, bathtub, washing machine, dishwasher, kitchen sink and toilet and isn't just from the toilet, which consists of 99.8 per cent water. The sewage is transported to the treatment plant through pipes and pump stations. In other words, there is a flow of pure and impure water. If this flowing water in the pipes has no traces of impurity like no change in colour, smell or taste, the water will be *tahīr* or pure (Al-Kasaniyy, 1998 & Al-Quduriyy, 1997). But, if the sewage water has traces of impurity in its colour, taste or smell, it may proceed to recycle wastewater treatment process (Ahmad Zaharuddin, 2004). The process of wastewater treatment is explained as follows (Renne, 2011):

- i. Sewage first goes through advanced primary treatment in which water is separated from large particles, then enters sedimentation tanks where chemicals make primary sludge settle to the bottom and scum rise to the top. Once the water is separated, 80 per cent of the solids have been removed, and the wastewater is clean enough to be discharged to the ocean.
- ii. In secondary treatment, bacteria are added to the wastewater to ingest organic solids and produce secondary sludge that settles to the bottom.
- iii. Tertiary treatment filters apply the water to remove whatever solids remain, disinfect it with chlorine, and remove the salt. In California, tertiary-treated water is recycled and used for irrigation or industry. For Indirect Potable Reuse (IPR), recycled water eventually becomes drinking water. Tertiary-treated water undergoes advanced water technology and then spends time in groundwater or surface water, such as a reservoir, before being sent to drinking water supplies.

Advanced water technology first involves microfiltration, which strains out any remaining solids.

Based on the process above, an analysis of the water purification process from *Fiqh* perspective is explained below:

The advanced primary treatment the water goes through in stage one does not purify the water in terms of *Fiqh*. To become pure in *Fiqh*, the impure water must either:

- a) Mixed in a large body of pure water or two *qullah*.
- b) Flow with pure water.
- c) Pure water must be poured into the impure water tank causing a significant overflow of water after the impurities are removed.

All three methods mentioned are required, with the water's colour, taste, and smell must return to normality. The water has still not met the *Fiqh* purification standards at stages two and three, though it may be biologically clean. It should be noted that *tahārah* (purification) of water is only necessary for drinking and religious purposes. Tertiary-treated water may be used for irrigation, flushing (toilet) and so on. Tertiary-treated water for drinking water which spends time in groundwater or surface water, such as a reservoir, is *tahīr* because it is mixed with a large body of water.

Based on the fatwa from authorized parties, the treated or recycled water is considered pure and purifying, which is *muṭlaq* water because after the treatment process, especially using membrane water treatment technology, the element of *najāsah* disappears. So, the treated water is considered *muṭlaq* water and can be used for religious purposes.

Next, for the status of water produced after treatment sourced from *mutanajjis* water or grey/ black water, the informants' opinions also countered as below:

Informant 5 said that when we used the reverse osmosis treatment, all the molecules and ions were filtered and rejected. Therefore, pure and clean water is produced without odour, taste and colour. So, it is Shariah compliance. But, some parties argued about the process, which is not undergoing the natural process. The answer can be seen in the process in the industry to treat the water. The wastewater is usually treated and collected in the big tank, and the process is continuous. The water is not kept stagnant for a long time. So, the continuous process makes the water pure and clean. Overall, Informant 5 agreed, based on his experience from the scientific perspective, that membrane water treatment complies with Shariah because after going through the membrane treatment, the water produced is pure without colour, odour and taste. So, it is the indicator of water purification in Islam.

*“..when the wastewater..for example, sewage water like in Singapore..how do you want to make sure after it passes through the membrane treatment, whether the water is immaculate and has no more dirt in the water..or how do you want to make sure the water is complying to shariah to be used. The water needs to be released to a natural place first, and then we catch it back. There is a view like that..but my view is if you follow Fiqh principle, if there is no smell, taste and colour, it is halal and clean..”*

Thus, informant 5 has suggested several processes to give a clear perception to the consumer about the usage of treated water is:

- i. Before being treated, the water source is flowed and then collected in the catchment to ensure the water is continuously flowing and collected water is more than 2 *qullah*.
- ii. The fatwa is clear about the treating reclaiming water usage given by the Fatwa Community so that the consumers are confident to use the treated water, especially for Islamic grounds and purposes such as ablution and religious cleansing.

*“..there needs to be a clear fatwa on whether the water is halal or not ..even in Singapore, the usage of waste water is not active as before or is no longer there, I don't know..because what.. many Muslims feel like they are not sure about the status of NEWater because there is no clear fatwa. Whether that water can be drunk or not. So if there is a fatwa through a study like this, I support it for Muslims..”*

Although the fatwa has been issued clearly by MUIS, there still is doubt about the Muslims for reusing wastewater. So, the studies related to this issue need to be expanded to give more understanding and exposure related to this matter.

Informant 4 also gives the opinion:

*“..depends on the types of water..if it's come from sewage, it may be a bit difficult to explain to the community because people don't know the process. But maybe we can first approach the company..factory.. when the membrane application is already widely used. So the public's understanding of membrane technology is increasing. But I feel like in Singapore.. People are introduced to treated sewage water to be drunk.. After all, the project is having a problem to be continued because of the community's perspective. But now, one desalination plan is being developed there, where the water source is from seawater in 2018 and 2020 at*

*Marina Inn. So the source is not sewage water but seawater. The NEWater project has been stopped because the source is sewage water .. one of the reasons maybe it is difficult to process. After all, the sewage is quite dirty .. when the water is filthy, it needs to be pre-treated. I mean pre-treatment. The water must be collected first.. remove all the silt, and then you can use the appropriate membrane treatment.. or maybe you need to use nanofiltration first, then use reverse osmosis. The pre-treatment needs to be done first because...the big challenge for the membrane is fouling. If it's filthy, even if we use nanofiltration, it has to be filtered first... So there are many processes to backwash and clean the membrane. We need to look at the long term as well..compared to seawater which does not have big particles and is not dirty..it's just high in salt. Those are also the challenges..why don't people continue to use sewage water to be treated..”*

Next, informant 6 also agreed that using treated water is permissible:

*“..yes, it is Shariah compliant..if the water source is from the rain or stormwater or pipe tank in the house, it can be directly drunk or consumed after the filtration..”*

All informants also agreed on the permissibility of using treated water after undergoing the membrane treatment process.

#### **6.12.2 Membrane Filter Materials**

Materials for the membrane filter used also need to be taken into account. The consumers also need to note the status of the membrane filter to ensure the pureness and halal status of products used in daily human life.

Informant 4 said there are no issues in Shariah for membrane material starting from the preparation process until the operation.

*“..in my opinion, there are no issues regarding the membrane materials, and it is Shariah compliant because we did not use impermissible materials. We are using suitable and permissible chemicals only...”*

According to Informant 5, membrane materials used are permissible (halal) and agreed that the membrane water filter is Shariah compliance.

*“..the materials used for membrane filter is permissible. The polymer material is from clay. So, no issue arises for the status of the materials..”*

Informant 6 also agreed that there are no issues with the membrane materials, usually from polymer. According to informant 6,

*“..from preparation up to the operation of the membrane water treatment, I think it is Shariah compliant because we are not using any unpermissible materials..”*

Then, informant 6 also agreed that the membrane materials and components are Shariah compliant. The reason is membrane is not related to the bone materials as the membrane is not made up of bone.

*“..for my membrane, I did not use bone materials. I did not buy ready-made filters in the market..all parts in membrane filters are made up by myself. But I only bought a filter body to stand the other parts in the membrane that is made up of fibre. If the filter is made up of bone, it needs permission from SIRIM and costs about RM800,000..”*

Thus, based on the informant's explanation, it can be seen the status or *hukm* of the membrane water filter is permissible and regarded as Shariah compliance.

### 6.13 The Needs of Water Treatment and Purification Methods in *Fiqh* and Science

The need for water treatment and purification methods is high. From *Fiqh* perspective, these needs are divided into *maṣlahah* and *darūrah*. Then, for *maṣlahah*, *fuqaha* has categorised into *ḍaruriyyāt*, *hājīyyāt* and *tahsiniyyāt*. *Daruriyyah* is the essential requirement to be met by each individual to establish the *maṣlahah* of religion and the world. If not fulfilled, the world will not be moving smoothly, and the favour of the *akhirat* will be unsafe. This *maṣlahah ḍaruriyyah* is the perseverance of religion, self, life, lineage, intellect and property. At the same time, *hājīyyat* is the *maṣlahah* of the needs and wishes of human beings and to eliminate difficulties. Then, *tahsiniyyah* is the *maṣlahah* of customs and aspects of moral perfection (JAKIM, 2016).

Informant 1 decided that the needs of water treatment and purification methods nowadays are *maṣlahah* and *ḍarurah* because it is *maṣlahah ḍaruriyyah* as the use of water treatment to purify contaminated water now is compulsory to preserve the religion, self, life, lineage, intellect and property.

*“..Persevering of religion (hiḥz al-dīn) as muṭlaq water is very compulsory to take ablution for worship..we cannot agree to tayammum all the time..”*

Next, the perseverance of self is also included when water treatment is implemented because consuming contaminated water will damage health.

*“..Persevering of self (hifz al-nafs) also compulsory with the muṭlaq water because use the contaminated water endangered the health..”*

So, ensuring pure and clean water is compulsory because it is *maṣlahah daruriyyah*, the first stage in *Maqāsid Syarīah* or the requirement for well-being.

Informant 3 said that the need for water treatment in Malaysia is *maṣlahah*.

*“..the maṣlahah concept occurs when there are a lot of water sources in a place but only limited, and in Malaysia, the treated water is usually used for watering the plant and other external purposes only. But not for drinking and consuming. So, it is more to maṣlahah and not darurah.”*

#### **6.14 The Combination of Water Treatment and Purification Methods in *Fiqh* and Science**

The combination of water treatment and purification methods in *Fiqh* and science perspectives is very crucial when the use of water involves worship in Islam. This statement is supported by Informant 2 with several conditions.

*..” Good..because the combination of *Fiqh* principles in the water treatment and purification to the scientific methods will produce the best water, clean, pure, purified and safe to be consumed and used by the human..”*

But, there are some conditions to be fulfilled to combine both perspectives.

“..if the materials and operation principle complies with Shariah which covers the sources of filter in water filtration treatment, the source of water, end product or water produced from the water filtration treatment, it should be fine..”

*Maṣlahah* and *mafsadah* principles are essential elements to be counter for this study. *Maṣlahah* also is defined as the process of ensuring sustainability and perfect life for humans in all aspects. *Maṣlahah* is also related to conserving five important elements: preserve the deen or religion, soul, mind, descendent and property (Tahir & Kashim, 2016). So, the perseverance and management of water by using water treatment are considered the *maṣlahah* for Muslims and humans as the water is the primary source and vital for creatures based on the hadith of Prophet Muhammad:

الْمُسْلِمُونَ شُرَكَاءُ فِي ثَلَاثٍ: فِي الْمَاءِ وَالْكَلْبِ، وَالنَّارِ

"Muslims share in three things; water, pasture and fire."

(Hadith. Abu Dawud (3477) and Ibn Majah (2472))

Based on this hadith, we know that these three sources cannot be avoided: fire, water and pasture. These three are primary human resources. If none of these three sources exists, there is a problem. Water is the main thing, and a source of life, same with the others (fire and pasture) are also important for humans.

## 6.15 The Related Methods/ Theories in Membrane Water Treatment

Based on the findings from the document analysis and interview, it can be seen that water treatment involves some *Fiqh* theories, which are *istiḥālah*, *istihlāk* and *taghayyur* that are derived from the Arabic terms methods as discussed below:

### 6.15.1 *Istiḥālah* Theory

This term is from the root word *hawala*, which means change. In the use of *Fiqh*, the term "*istiḥālah*" refers to the change of something *najāsah* to a sacred and pure substance (al-Fayyumi, 1985). *Istiḥālah* is a change in the nature or physicality of matter, but the material's substance remains permanent (unchanged) (Ibn Hajar al-Haytamiyy, 1983). According to Al-Khatib (2003), *istiḥālah* is the change of a material into another form that is different in shape and nature. Next, (Ibn 'Abidin, 1992) mentions that it is a change in the substance or form of some material into a new material (*inqilāb al-<sup>c</sup> ayn*). *Istiḥālah* also is defined as the change of *najāsah* materials to other materials, either naturally or with an intermediate (Al-Zuhailiyy, 2007).

*Istiḥālah* is also a relevant medium change to be applied in the case of utilized products based on *haram* materials (Mohd Mahyeddin, 2016). through the several techniques below:

- i. Burning (*Istiḥālah bi al-Ihrāq*).
- ii. Decomposition (*al-Istihlāk*).
- iii. The transition of alcohol to vinegar (*al-takhallul*).
- iv. Lighting (*al-Istisbāh*).
- v. Quarantine (*al-Istibrā'*).

*Istihālah*, or transformation from the scientific view, can be classified into three parts: the transformation of physical appearance, chemical substances, and both physical and chemical (Arieff Salleh et al., 2020). Physical appearance transformation includes taste, colour and smell. Chemical transformation means changes in chemical substances in materials. In contrast, the transformation of the physical and chemical of one substance involves complete changes and producing new material. So, in this research context, the membrane water treatment includes the decomposition or assimilation (*istihlāk*) theory. The process of *istihālah* can be seen from the change of *mutanajjis* water into *muṭlaq* water.

#### 6.15.2 *Istihlāk* Theory

*Istihlāk* of the word the root of *halaka* carries the meaning of perish. *Istihlāk* is one types of *istihālah*. *Istihlāk* or decomposition means mixing a substance with another substance that causes loss of properties and characteristics until it is considered dissolved even though it still exists (Hammad, 2004). The term "*istihlāk*" usually leads to two meanings:

- i. To make something perish (*halik*), it is said: Someone *istihlāk* his property; that is, he spends and spends it.
- ii. Mix one *ain* with another *ain*, so that the existing properties disappear to it or the intended features, in which case it so perishes, though there are still residues, such as mixing alcohol or milk in water or a liquid.

*Istihlāk* also refers to the consumption or assimilation process, which means the blending of a small amount of a prohibited or defiled substance with a dominant clean and permissible one resulting in the obliteration of the prohibited or defiled substance altogether. This process will be if the properties of the dominant substance, such as colour, taste and smell, overwhelm the weaker substance, which is wholly assimilated into the dominant one (Arief Sallah, et al., 2020). The *istihlāk* concept is directly explained by the *fuqaha* in *Fiqh turath* books related to *mutanajjis* water and the water quantity. Hadith related to this concept is from ‘Abd Allah bin ‘Umar reported:

الواليد أسامة، عن أبو حدثنا: وغيرهم، قالوا علي بن والحسن شيبة أبي بن وعثمان العلاء بن محمد حدثنا  
عمر بن الله عبد الزبير، عن بن جعفر بن محمد كثير، عن بن  
لم قلتين الماء كان إذا لم رسول والسباع، فقال الدواب من ينوبه وما الماء عن الله رسول سئل: قال أبيه عن  
الحديث يحمل

“The Prophet was asked about the status of stagnant water that is being licked by reptiles and wild animals (whether the water is still clean). Then the Prophet said, “If the water exceeds two *qullah*, then it does not become unclean.”

(Imam Abu Dawud (1997: 1/17, hadith no. 63), al-Tirmidhiyy, al-Nasa’i, Ibn Majah, and Ahmad)

Another related hadith by the Prophet Muhammad is when he was asked about *Buda'ah*'s well, which has been mixed with menstrual blood, dog carcass and other rubbish. This hadith was recorded by Imam Abu Dawud (1997) and explained by Prophet Muhammad:

حدثنا موسى بن إسماعيل حدثنا حماد أخبرنا عاصم بن المنذر عن عبيد الله بن عبد الله بن عمر، قال:

حدثني أبي: أن رسول الله قال: {إذا كان الماء قلتين، فإنه لا ينجس}.

The Prophet Muhammad said, "If the water has exceeded two *qullah*, then it would not be unclean if mixed with the unclean."

(Imam Abu Dawud (1997: 1/17, hadith no. 65)

*Fuqahā'* have discussed all the hadith above and agreed to involve in the *istihlāk* process. According to Taymiyyah (1987), *the istihlāk concept can only be applied to conditionally allowed goods mixed with unclean substances.*

“Indeed Allah forbids disgusting unclean such as blood, carcass, pork and the like. If the unclean is dropped into water or others and its substance has dissolved (*istahlakat*), and there are no more substances of the blood, carcass, or pork origin; hence the water is clean. Similar to drops of wine mixed with a bunch of clean water, then dissolving the wine substance; hence it is not said that anyone who drinks that water is drinking wine. If wine is transformed (*istahala*) to vinegar by itself, the scholars unanimously said that vinegar is clean.”

This situation can be seen from the prophet Muhammad's action, adding water to *nabidh* so that the taste and smell of *nabidh* become less as the water dissolves into the *nabidh*.

But, *fuqahā'* have a different view on this *istihlāk* process. Hanafi *madhhab* said that there are two factors of changing the property of the unclean to clean, which are common plight, and a complete substance transformation has occurred during the process (Ibn 'Abidin, 1992). He also stated that the *'illah* of that legal status is the change

(*taghayyur*) and exchange (*inqilab*) of the fact and his result is as such due to common plight.

In this water treatment context, *istihlāk* process involves when unclean or impurities mixed in with pure water, and the water content does not exceed two *qullah* (270 litres); hence the water is considered *mutanajjis*. However, should the water be more than two *qullah* and not contaminated with any of the unclean elements such as taste, smell or colour, the water remains clean. So, according to Hanafi, he agreed to apply the *istihlāk* process but with the condition of complete transformation or dissolving and decomposition process.



Source: Adapted from Muhammad Aizat et al. (2012)

**Figure 6.1:** *Istihlāk* Process

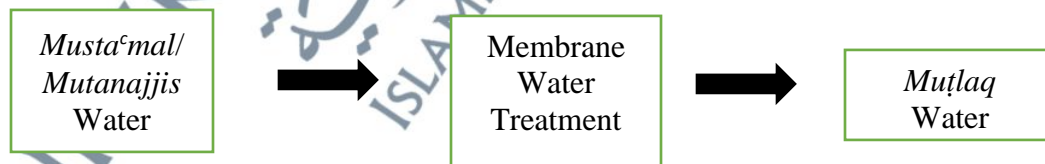
This figure shows *the istihlāk process consists of three main elements: origin/raw material, intermediate materials and finished products. The istihlāk process occurs when the raw material is mixed and dissolves with intermediate materials. These materials need to be identified in their hukm, whether halal or haram sourced, to ensure the hukm of the finished product. The result can be explained as follows:*

**Table 6.2:** Categories and *Hukm* of *Istihlāk* Process

Source: Mohd Mahyeddin (2016)

Categories	Description	<i>Hukm</i> of Finished Products
<i>Istihlāk Ṣahīhah</i> (Accepted <i>Istihlāk</i> )	A changing process from halal materials mixed with halal or haram conversion agent, which results in halal finished products *( <i>halal</i> materials are dominant)	<i>halal</i>
<i>Istihlāk Fāsidah</i> (Damaged <i>Istihlāk</i> )	A mixing process of halal or haram materials with halal or haram conversion agents which results in haram finished products	<i>haram</i>
<i>Istihlāk Mulghah</i> (Unaccepted <i>Istihlāk</i> )	A changing process from haram raw materials mixed with haram conversion agents which results in haram finished products.	<i>haram</i>

However, Anisah (2014) states there is little difference between the meaning of *istihālah* and *istihlāk*, where the term involves a change in the properties of matter for the same material, while *istihlāk* involves the mixture of matter of two different substances until one of them decomposes in the matter of the second material. However, thus, the concept of law determination from these two methods remains the same where the law (whether sacred/halal or *najis/haram*) to be decided is based on the new properties or features resulting from the final material and rather than based on properties or characteristics before this process took place. So, for membrane water treatment, the process of *istihālah* can be seen from the change of *mutanajjis* and *mutaghayyir* water into pure water.



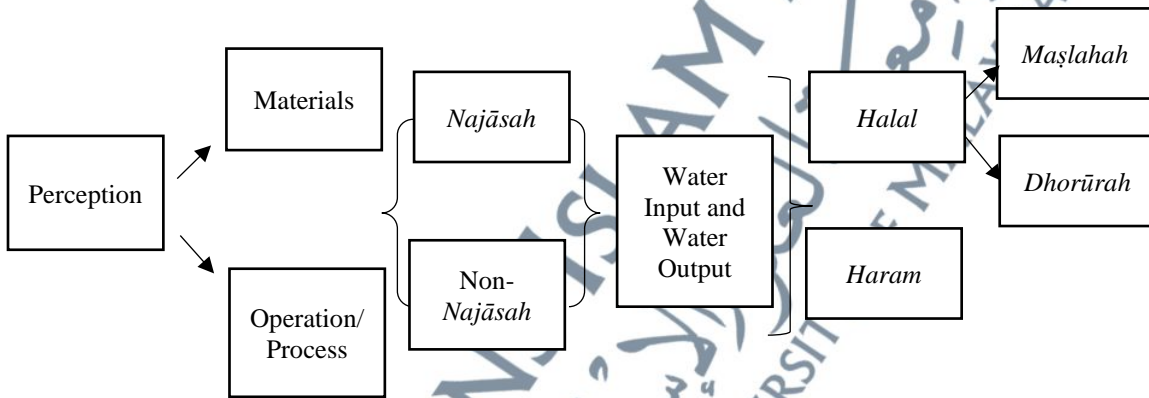
Source: Researcher (2021)

**Figure 6.2:** The Changing Process of *Musta'mal/ Mutanajjis* Water to *Muṭlaq* Water

So, the *hukm* of water produced from the membrane water treatment needs to be reviewed from this aspect to know if the water is *muṭlaq* because the sources of this material are essential to ensure the acceptance of worship for using this water from membrane treatment for religious purposes.

### 6.16 Membrane Water Treatment in Fiqh View

Thus, the suggested membrane water treatment can be simplified as follows:



**Figure 6.3:** Concept of the Membrane Water Treatment

Firstly, the perception of consumers, especially Muslim users, needs to be counted because this issue involves the religious matter about the *hukm* and status of using water treated from membrane water treatment technology. Muslim often doubt using the water produced from the membrane water treatment because the water source consists of *mutanajjis* and *mustaʿmal* waters.

Only *muṭlaq* water can be used for religious purposes. While operation/ process of membrane water treatment, including the status of water source, is clearly stated and issued by the authorized fatwa that it is permissible to use the treated water because after being

treated, the status of water is considered *muṭlaq* water and can be used for religious purposes with the specific conditions and processes.

After ensuring the status of the water source for the operation and process of the membrane treatment, whether from *najāsah* or non-*najāsah* sources, both need to undergo the purification process, which eliminates the *najāsah* that contaminated the water from the aspects of odour, taste and colour by having the pre-treatment process. Then, the water will go through the membrane treatment process and be collected in one container to add the other *muṭlaq* water so the mutanajjis water will turn into *muṭlaq* water and be permitted to be used for religious purposes. These processes are important to ensure the status of water.

Then, consumers are also issued for using materials in membrane water filters as the materials are made up of various resources depending on the manufacturers and water treatment usage. The materials used for the membrane filters for water treatment are made up of organic and inorganic materials. Organic materials consist of polymers, either cellulose-based or modified organic polymers. While inorganic materials consist of glass membranes, ceramic membranes, metallic membranes and carbon membranes. also the latest one is zeolitic membranes. The discussion of the materials can be simplified as follows:

**Table 6.3:** Types of Membrane Materials

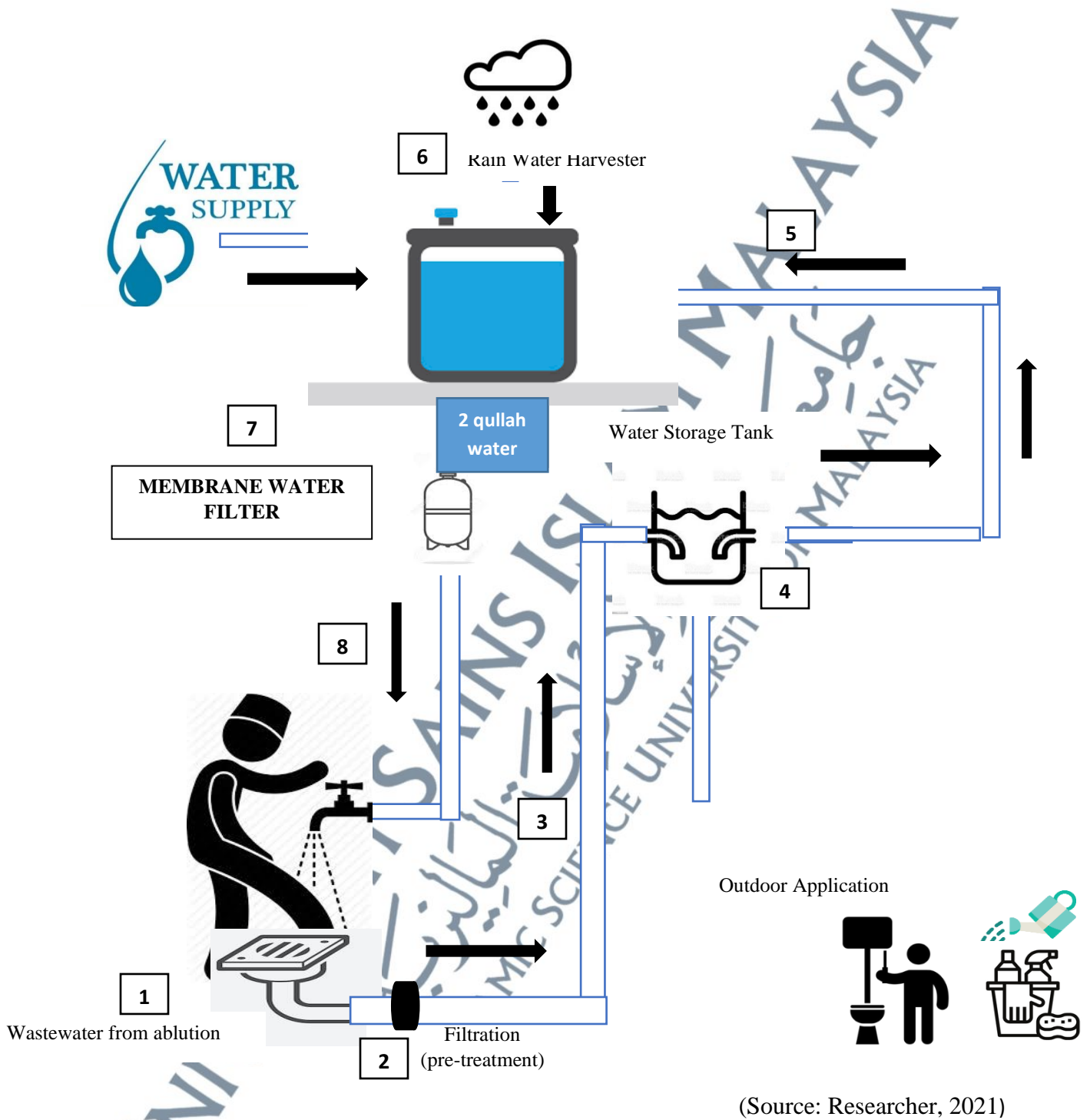
Types of Membrane Materials	Categorization	Details	Issue
Organic Materials	Polymers either from cellulose-based or modified organic polymers		
Inorganic Materials	glass membrane	glass membrane (silica)	No
	ceramic membrane	ceramic membrane	Yes
		high-cost ceramic material (combination of metal like aluminium, titanium, silicon or zirconium, zinc, tin and iron with non-metal in the form of oxide, nitride or carbide to form a variety of inorganic nanoparticles such as carbon nanotubes, alumina or aluminium oxide, titanium oxide, zirconium dioxide or zirconia. Zinc oxide, silver, tin oxide)	
		low-cost ceramic materials (Powder like clay, dolomite, apatite, fly ash, natural raw clay and kaolin (Chine clay))	
metallic membrane	metallic membrane	No	
		(The sintering of metal powders like stainless steel, molybdenum or tungsten)	
carbon membrane	carbon membrane	carbon membrane	No
		(Poly acrylonitrile, cellulose triacetate, phenol formaldehyde and poly (furfural) alcohol)	
zeolitic membranes	zeolitic membranes	zeolitic membranes	No
		(Used in gas separation, pervaporation and	

separation of ions from an aqueous solution of reverse osmosis)

So, the consumers need to identify the source of the materials manufactured for membrane water treatment filters, especially inorganic materials, which consist of ceramic membranes. Using low-cost ceramic materials from powder like clay, dolomite, apatite, fly ash, natural raw clay and kaolin (China clay) may be an issue when the sources are from haram materials such as kaolin (China clay).

The source of the China clay could come from pig bones that are prohibited from being used from *Fiqh* perspective as the status of output water becomes *haram*. Kaolin may be a choice for the manufacturer because of the lower price rather than other materials. But this material-based issue can rely on the authorities' role, such as JAKIM, to monitor the materials used for the filters because all products need to be validated by JAKIM for the halal or vice versa.

So, both materials of the membrane filter and the status of water sources from the operation/ process of the membrane water treatment need to be clarified whether considered as *najāsah* or non-*najāsah* because both are affected the status/ *hukm* of water output or the treated water produced from membrane water treatment. Next, the status of treated water or water produced will be determined, whether *halal* or *haram*. If *halal*, Muslim consumers can be used and consume confidently; if *haram*, it is not permissible to consume. Lastly, it is crucial to notice that despite the halal status, it still needs to be seen whether the product contributes to *maṣlahah* or *ḍarūrah/ hajat* to the consumers. *Maṣlahah* and *mafsadah* principles are essential elements to be counter for this study. So, for practical and technical purposes, the membrane water treatment is illustrated below:

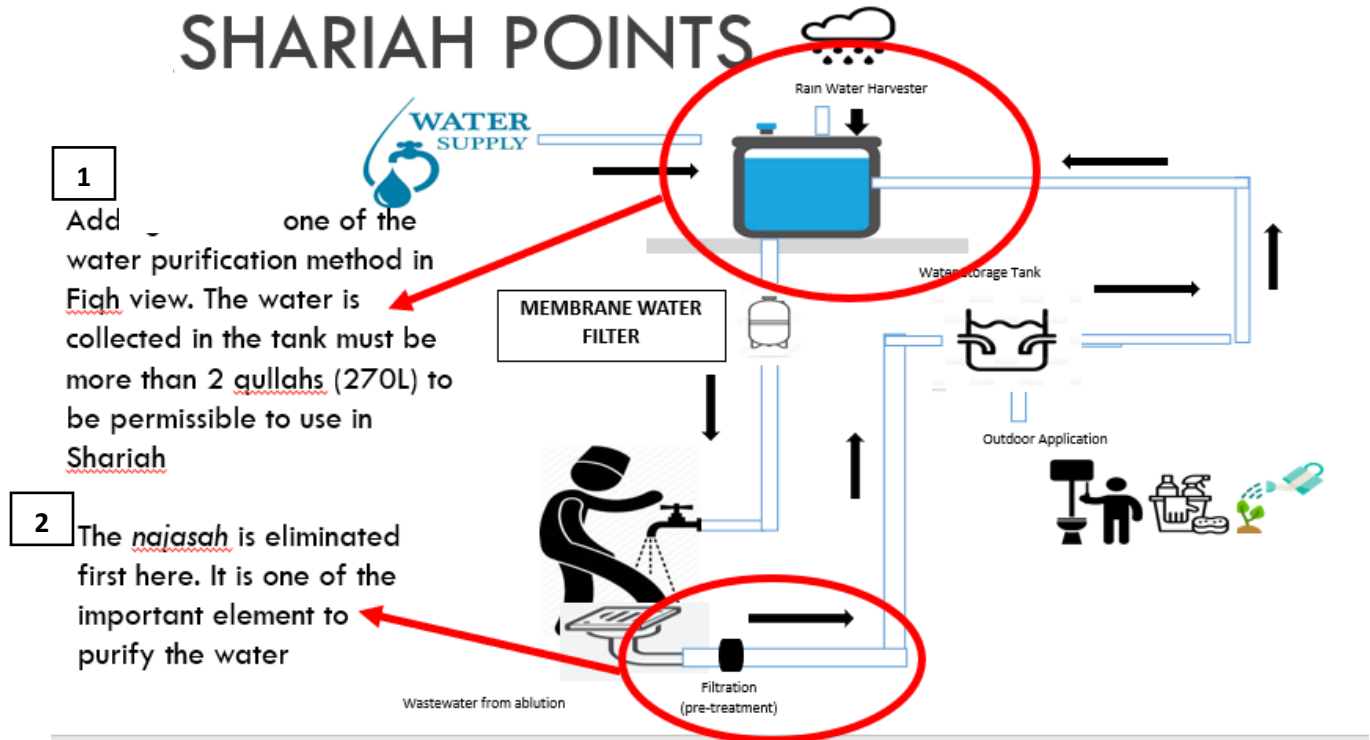


**Figure 6.4:** Shariah Compliance Membrane Water Treatment

The model flows as follows:

1. Wastewater from the ablution flows to the pipe drain.
2. The wastewater has a pre-treatment process (filtration)
3. The wastewater is then pumped into the water storage tank.
4. The water from the water storage tank can be used directly for outdoor purposes such as toilet flushing, gardening, watering, and cleaning.
5. The water flows and is collected in the tank containing more than 2 *qullah* water (270L) to be permissible for religious purposes (ablution).
6. Adding water from other sources (rainwater collection) and the main water supply.
7. Next, the water from the water storage tank flows into the membrane water filter (ultrafiltration or nanofiltration process) to filter all contaminants and produce clean and pure water. Through a membrane filter (ultrafiltration or nanofiltration process), the water is considered clean and follows the drinking water standard by WHO (Science Perspective) that can be drunk directly.
8. Next, the *muṭlaq* water flows back to be used for ablution purposes.

# SHARIAH POINTS



(Source: Researcher, 2021)

**Figure 6.5:** Shariah Point of Membrane Water Treatment Process

1. Adding water is one of the water purification methods in *Fiqh* view. The water collected in the tank must be more than 2 *qullah* (270L) to be permissible in *Shariah*.
2. The *najāsah* is eliminated first here. It is one of the critical elements in purifying the water

## 6.17 Conclusion

Two aspects need to be determined for the utilization of treated water being processed by membrane water treatment: the water source and the source of materials used

as the filter. In determining the status and *hukm* of treated water usage from the *mutanajjis* and *mustaʿmal* water, eliminating the *najāsah* from the water is essential. It must be done first before being treated, so the *hukm* of water is pure and considered *muṭḥaq* water. Three purification methods need to be applied to change the *mutanajjis* water into *muṭḥaq* water which is by *ṭarīqah al-nazh* (eliminate and remove the *najāsah* in water), *ṭarīqah al-mukatharah* by adding the *muṭḥaq* water into the *mutanajjis* water to exceed up to two *qullah* and *ṭarīqah al-taghyir* which is changing the water nature naturally or by using aided substances to eliminate the *najāsah* is water.

## CHAPTER VII

### DISCUSSION AND CONCLUSION

#### 7.1 Introduction

Shariah is a framework that Muslims follow in conducting the daily affairs of life. This framework, based on the al-Quran and al-Sunnah, provides mankind with guidelines in every aspect of life, in concordance with the fact that Islam is a complete way of life. The general principles of Shariah are formed using a thought process called the *istislāh* which focuses on the greater good of mankind. All innovations must comply with the Shariah to ensure sustainability and the *maṣlaḥah* for humans and nature.

#### 7.2 Research Summary

The findings of this study can be discussed from two perspectives:

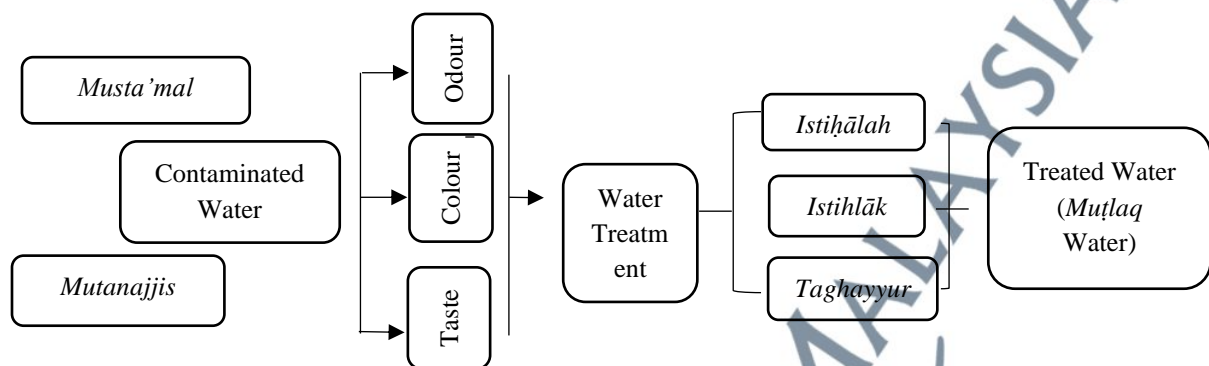
##### 7.2.1 The *Hukm* of Water Sourced for Membrane Water Treatment

The water source used for the treatment consists of *musta'māl* water (water that has been used) and *mutanajjis* water (water that has been contaminated with *najāsah*). Islam requires *mutlaq* water for purification, especially for religious purposes such as ablution, *ghusl hadath*, etc. So, the status of *hukm* and *fatwa* regarding the utilization of treated water

needs to be studied as the primary reference in this research. Based on the findings, all the related *fatwa* issued which are taken from the inside and also outside of the country mentioned, such as the *fatwa* from *Muzakarah* of the Fatwa Committee of the National Council, the *fatwa* of Darul Ifta' Saudi Arabia, *fatwa* of the Islamic Religious Council of Singapore and also *fatwa* of the Indonesian Ulama' Council that it is permissible to use treated water with the several conditions guided to consider the treated water sourced especially from *mutanajjis* water as *mutlaq* water.

### **7.2.2 The *Hukm* of Materials Used for Membrane Filter Water Treatment**

Next, the filter materials used in membrane water treatment technology must also be discussed for the status of *hukm*. The sources of manufacturing the membrane filters are made up of various materials that can be concluded as organic and inorganic materials. Inorganic materials such as ceramic need to be alerted because the materials used can consist of powder like clay, dolomite, apatite, fly ash, natural raw clay and kaolin (China clay). The cheapest one is the kaolin, easily purchased and always a choice by the manufacturer. So, it is vital to know the source of materials used as the filters and ensure the halal logo by JAKIM. Next, the *Fiqh* theories involved during the process of treated water by the membrane water treatment are *istiḥālah*, *istihlāk* and *taghayyur* processes or theories. These theories can be seen and discussed based on the following figure:



(Source: Researcher, 2021)

**Figure 7.1:** The Theories Involves in the Membrane Water Treatment Process

Based on the figure above, the contaminated water sourced from the *musta'mal* and *mutanajjis* water is used to produce treated water. The first stage is eliminating the *najāsah* contaminated in the water by looking at the water's nature, odour, colour and taste. After the *najāsah* is eliminated, the water undergoes pre-treatment (traditional treatment), which is filtration to eliminate foreign substances and then goes to the membrane water treatment process. The *Fiqh* theories involved here are *istihālah*, *istihlāk* and *taghayyur* processes. All the processes involve changing the *najāsah* materials into pure materials. Then the purification process can be applied to produce *muṭlaq* water which are:

1. *ṭarīqah al-naḥh* is eliminate and remove the *najāsah* in water, (this method is used in the pre-treatment process of the membrane water treatment process which is filtering (filtration) to eliminate foreign substances)
2. *ṭarīqah al-mukatharah* by adding the *muṭlaq* water into the *mutanajjis* water to exceed up to two *qullah*, (thid process is used when the other source of

water (*muṭlaq* water) which are from rain water harvester and main water supply are added into the main tank of the treatment process).

3. *ṭarīqah al-taghyīr*, which is changing the water's nature naturally or by using aided substances to eliminate the *najāsah* in water.

The treatment of *musta'mal* and *mutanajjis* water differ in Islam. In membrane water treatment process, the method of treated the *mutanajjis* water is used though the most water consisted in ablution water is *musta'mal* water only because the method of water purification of *musta'mal* water is easier compare the *mutanajjis* water.

### 7.3 Research Suggestion and Recommendation

The continuity of this study is recommended for further discussion regarding the technical aspects of the membrane water treatment that can be applied and attached to the ablution part or area in mosques as this suggestion can be saved and reused the *musta'mal* and *mutanajjis* water.

### 7.4 Conclusion

Thus, all the objectives have been answered in this study which are objective one is to identify the concept of treatment and purification of water (*taḥīr al-mā'*) according to *Fiqh* and science perspectives is discussed in chapter four (4): Membrane Water Treatment and Purification in *Fiqh* and Science Perspectives. The second objective, which is to study the *hukm* and status of membrane water treatment from *Fiqh* perspective, is also elaborated in chapter five (5). Next, the third objective is to evaluate the membrane water treatment in *Fiqh* view, presented in the chapter (6) in the title of data analysis and findings.

Hence, Shariah is a framework that Muslims follow in conducting the daily affairs of life. Based on the Quran and Sunnah, this framework provides mankind with guidelines in every aspect of life, in concordance with the fact that Islam is a complete way of life. At the same time, the membrane field has been applied and advanced immensely. This technology has been economical, environmentally friendly, versatile and easy to use. Thus, membranes are a leading choice for water purification applications and should continue for many years. Islam supports technological advances as long as the advancement is parallel and in line with the Shariah guideline.

