MEMBRANE WATER TREATMENT: A JURISTIC EVALUATIVE STUDY

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AUTHOR DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged

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Sincerely,
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ABSTRAK

Penjimatan air adalah perkara yang sangat penting dalam Islam. Penggunaan semula air buangan melalui proses rawatan air dengan memfokuskan kepada teknologi rawatan air membran adalah salah satu cara penjimatan air. Walaubagaimanapun, perbincangan dan perdebatan dalam kalangan pakar dan masyarakat terus berlaku kerana sumber air rawatan ini diperoleh daripada air *musta^{c}mal* iaitu air yang suci tetapi tidak menyucikan dan juga air *mutanajjis* iaitu air yang tidak suci dan tidak menyucikan. Selain itu, bahan pembuatan penapis air membran turut menjadi pertikaian dari segi halal atau sebaliknya. Oleh itu, kajian ini bertujuan untuk mengenalpasti konsep rawatan dan penyucian air menurut perspektif *Fiqh* dan sains. Seterusnya, kajian ini juga mengkaji kaedah rawatan dan penyucian air membran dan menilai rawatan air membran dari perspektif *Fiqh*. Kajian ini menggunakan kaedah kualitatif dengan cara analisis dokumen dan temubual terhadap enam orang pakar dalam bidang *Fiqh* dan teknologi air. Kajian ini mendapati bahawa terdapat kaedah khas dalam rawatan air *musta^{c}mal* dan *mutanajjis*. Jika kedua-duanya digabungkan, ianya akan menghasilkan kaedah rawatan air yang selari dengan syariah.

ABSTRACT

Water saving is significant in Islam. Reusing wastewater through the water treatment process focused on membrane water treatment technology is one of the ways to save water. However, discussions and debates among scholars and the community continue to occur because the source of this water treatment is obtained from *musta^{c}mal* water (pure water but not purifying) and *mutanajjis* water (impure water that does not purify). In addition, the material for manufacturing membrane water filters is also a dispute in terms of halal or otherwise. Therefore, this study aims to identify the concept of water treatment and purification according to the perspective of *Fiqh* and science. Next, this study also studies the methods of membrane water treatment and purification and then evaluates the process of membrane water treatment from *Fiqh* perspective. This study uses qualitative research methods through document analysis and interviews with six experts in the field of *Fiqh* and water technology. This study found that there are special methods in the treatment of *musta^{c}mal* and *mutanajjis* water. Combined, it will result in a water treatment method that aligns with shariah.

الملخص

إن توفير المياه هو أمر مهم جدا في الإسلام. وتعتبر إعادة استعمال المياه العادمة أو مياه الصرف الصحي من خلال عملية معالجة مياه هي إحدى طرق توفير المياه. ولكن تستمر المناقشة والمناظرة لانهائيا حول هذه القضية لدي العلماء الاختصاصيين والمجتمع لأن مصدر مياه المعالجة من الماء المستعمل وهو ماء طاهر بنفسه وليس مطهّرا ومن الماء المتنجس وهو ماء غير طاهر وليس مطهّرا. وبالإضافة إلى ذلك، هناك جدال عن مادة تصنيع فلاتر أو منقّيات المياه الغشائية من حيث حلالها أو غير ذلك. فتهدف هذه الدراسة إلى معرفة مفهوم معالجة المياه وتنقيتها من منظور الفقه والعلوم. وبعد ذلك، تبحث هذه الدراسة عن طرق معالجة المياه الغشائية وتنقيتها من منظور الفقه وتقترح نموذجا لمعالجة المياه الغشائية المتوافقة بالشريعة ليتم استخدامه عند الماليزيين. فتستخدم هذه الدراسة الأساليب النوعية عن طريق تحليل الوثائق والمقابلات مع ستة خبراء في مجال الفقه وتكنولوجيا المياه. وبها وجدت هذه الدراسة أن هناك طرق خاصة في معالجة الماء المستعمل والماء المتنجس. وإذا تم الجمع بين الاثنين، فسيؤدي إلى طريقة معالجة المياه التي تتوافق مع الشريعة.

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LIST OF SYMBOLS

BOD	Biochemical Oxygen Demand
CAS	Conventional Activated Sludge
CMS	Carbon membranes
COD	Chemical Oxygen Demand
ED	Electrodialysis
MF	Microfiltration
NF	Nanofiltration
NMT	Nano Membrane Toilet
RO	Reverse Osmosis
TOC	Total Organic Compound
TSS	Total Suspended Solid
UF	Ultrafiltration
UV	Ultra Violet

LIST OF APPENDICES

LIST OF TRANSLITERATION

I. Alphabet

Transliteration	Example	Latin letters	Arabic letters
al-ma’a	الماء	’	ء
burd	برد	b	ب
tathir	تثير	t	ت
thawb	ثوب	th	ث
jidār	جدار	j	ج
halal	حلال	ḥ	ح
khādim	خادم	kh	خ
dīk	ديق	d	د
dhahab	ذهب	dh	ذ
rafīq	رافق	r	ر
zamīl	زامل	z	ز
sa^{c}	ساء	s	س
shaʿb	شعب	sh	ش
sakhr	صخر	ṣ	ص
dayq	ضيق	ḍ	ض
taharah	طهارة	ṭ	ط
zahir	ظاهر	ẓ	ظ
ʿaql	عقل	^{c}	ع
ghulām	غلام	gh	غ
fuqaha	فقهاء	f	ف
qullah	قللة	q	ق
kitab	كتاب	k	ك
lubb	لبّ	l	ل
musta^{c}mal	مستعمل	m	م
najāsah	نجاسة	n	ن
hawl	هول	w	و
waraq	وارع	h	ه
yam	يمّ	y	ي

II. Short Vowels

Arabic letters	Latin letters	Example	Transliteration
ـــــــــَـــ	a	قنت	Qanata
ـــــــــِـــ	i	شرب	Shariba
ـــــــــُـــ	u	جمع	Jumi‘a

III. Long Vowels

Arabic letters	Latin letters	Example	Transliteration
ى/أ	ā	احيأ	Iḥyā’
ي	ī	تجديد	Tajdīd
و	ū	علوم	‘Ulūm

IV. Diphthongs

Arabic letters	Latin letters	Example	Transliteration
و	aw	قول	Qawl
ي	ay	غير	Ghayr
ي	iyy/ ī	عربي	‘Arabiyy or ‘arabī (at the end of the sentence)
و	Uww/ū	عدو	‘Aduww or ‘adū (at the end of the sentence)

LIST OF ABBREVIATIONS

AD	After decade
AMTEC	Advanced Membrane Technology
APA	Environmental Protection Agency
BC	Before Century
BOD	Biochemical Oxygen Demand
CLIS	Council of Leading Islamic Scholars
COD	Chemical Oxygen Demand
DAF	Dissolved Air Flotation
DNA	Deoxyribonucleic Acid
DO	Dissolved Oxygen
DOE	Department of Environment
Domestic	Malaysian Halal Certification Procedure Manual
EPA	United States Environmental Protection Agency
EPU	Economic Planning Unit
GAC	Granular Activated Carbon
GDWQ	The Guidelines for Drinking-Water Quality
GEMS	Global Environment Monitoring System
HDC	Halal Industry Development Corporation
IIUM	International Islam Universiti Malaysia
INHART	International Institute for Halal Research and Training
INWQS	Interim National Water Quality Standards for Malaysia
JAKIM	Department of Islamic Development Malaysia
MATRADE	Malaysia External Trade Development Corporation
MDTCC	Ministry of Domestic Trade, Co-operatives and Consumerism
MHMS	Malaysian Halal Management System
MITI	Ministry of Trade and Industry
MOSTI	Ministry of Science, Technology and Innovation
MPC	Malaysia Productivity Corporation
MUI	The Indonesian Ulama' Council
n.d.	No Date
NH_3N	Ammoniacal Nitrogen
NMT	Nano Membrane Toilet
OCWD	Orange Country Water District
OEM	Original Equipment Manufacturer
PBUH	Peace be Upon Him
PIC/S	Pharmaceutical Inspection Cooperation Scheme
RA's	Radiaullah anhu
SAW	Salallah Alaihi Wa Sallam
SIRIM	Standard and Industrial Research Institute of Malaysia
SMEs	SME Corporation Malaysia
SS	Suspended Solids
SWT	Subhanallah Ta'ala
TOC	Total Organic Compound
TSS	Total Suspended Solid
UAE	United Arab Emirates
UK	United Kingdom

UM	Universiti Malaya
UN	United Nations
UNEP	United Nations on the Environment
UNESCO	United Nations Educational, Scientific and Cultural Organization
USA	United State
USGS	United States Geological Survey
USIM	Universiti Sains Islam Malaysia
UTHM	Universiti Tun Hussein Onn Malaysia
UTM	Universiti Teknologi Malaysia
UV	Ultraviolet
WHO	World Health Organization
WQI	Water Quality Index