

الآية

قال الله تعالى:

وَجَعَلْنَا مِنَ الْمَاءِ
كُلَّ شَيْءٍ حَيٍّ أَفَلَا
يُؤْمِنُونَ

صدق الله العظيم
الأنبياء الآية (30)

With love I dedicate this study

To my loved father

To my dear mother

To my sisters and brothers

To my husband

To all mothers around the world

Acknowledgements

I would like to express my deepest and endless gratitude to Dr: Hassan Mohammed Ibrahim Alhassan, for his fruitful guidance, professionalism, enthusiasm, valuable guidance, patience, kindness, consistent encouragement, support and guidance that I received throughout the research work. My great thanks extend to the staff of medical physics department in Alnilein University .Finally deep thanks to my family for their consistent mental support.

Abstract

The aim of this study is to provide clear and simple information about the effect of radiofrequency on distilled water (33C, 25.9 μ S/cm/50ml, and 10cm). The measurements were carried out by using uv- Spectroscopy, then the data collected have been analyzed using Origen soft ware.

The prepared samples were exposed to radiofrequency radiation Which generated from Rubidium high-frequency lamp with different frequencies; 500MHz (MRI), 900MHz (Mobile telephone) and 1800MHz (Tower communication) exposed at (two hours ,four hours).and measured thermal effect, change in conductivity and optical properties (absorption) .

The result showed that: the temperatures which were measured every (20 minutes) using thermocouple, increased with time and the time is more affected than frequency. Then conductivity was measured after exposure using electrical conductivity meter, and it was found that it increased with increase of frequency and time. Optical properties (absorption) was measured after exposure using UV-visible spectroscopy and it was found that when frequency increases the absorption decrease.

مستخلص البحث

الهدف من هذه الدراسة هو تقديم معلومات واضحة وبسيطة حول تأثير الترددات (33C, 25.9 μ S/cm/50ml, and 10cm) الراديوية على الماء المقطر (33 أجريت القياسات من خلال إستخدام جهاز التحليل اتلطيقي بالأشعة فوق (Origen soft ware) البنفسجية , ثم تم جمع البيانات وتحليلها بإستخدام برنامج أوريجين ware.).

تعرضت العينات المعدة لأشعة الترددات الراديوية التي ولدت من الريميديوم بتردد : عالي مع ترددات مختلفة 500MHz (MRI), 900MHz (Mobile telephone) and 1800MHz (Tower communication) تم تعريض العينات لمدة (ساعتين وأربع ساعات) وتم قياس التأثير الحراري للتغير (absorption) في الموصلية والخصائص البصرية (الإمتصاص) وأظهرت النتيجة أن: درجات الحرارة التي تم قياسها (كل 20 دقيقة) باستخدام أداة قياس حرارية (thermocouple) إزدادت مع الوقت و, والوقت هو أكثر تأثرا من التردد . ثم تم قياس الموصلية بعض التعرض باستخدام جهاز (electrical conductivity meter) , وتبين أنها تزيد مع زيادة التردد والوقت. الخصائص البصرية (الإمتصاص absorption) قد تم قياسها بعض التعرض باستخدام جهاز التحليل الطيفي للأشعة فوق البنفسجية المرئية (UV-visible spectroscopy) وتبين أنه عندما يزيد التردد يتناقص الإمتصاص .

Table of contents

الإياه	i
Dedication.....	ii
Acknowledgements	iii
Arabic abstract.....	iv
English abstract.....	v
Contents.....	vi
List of tables	vii
List of figures	viii
Chapter one: General Introduction	
1.1. Introduction.....	1
1.2. Radiofrequency.....	1
1.2.1. Special properties of RF current	1
1.3. Water.....	2
1.3.1. Chemical and physical properties.....	3
1.4. Problem of study.....	5

1.5. Objectives.....	5
----------------------	---

1.6. Thesis outline.....	5
--------------------------	---

Chapter Two: Literature Review

2.1 Theoretical background.....	6
---------------------------------	---

2.1.1 Electromagnetic spectrum.....	6
-------------------------------------	---

2.1.1.1 Ionizing radiation.....	8
---------------------------------	---

2.1.1.2 Non-ionizing radiation.....	10
-------------------------------------	----

2.1.2 Radiofrequency Electromagnetic Waves	15
--	----

2.1.2.1 Definitions.....	15
--------------------------	----

2.1.2.2 Sources of RF	17
-----------------------------	----

2.1.2.2.1 Natural Sources of RF.....	17
--------------------------------------	----

2.1.2.2.2 Biological Sources of RF/EMF	18
--	----

2.1.2.2.3 Consumer Products	18
-----------------------------------	----

2.1.2.3 application of RF.....	23
--------------------------------	----

2.1.2.3.1 RF Sources Used in Industry	23
---	----

2.1.2.3.2 RF Sources Used in Medicine	24
---	----

2.1.3. Water.....	27
-------------------	----

2.1.3.1. Chemical and physical properties.....	28
--	----

2.2 Previous studies	30
----------------------------	----

Chapter Three: Material and Method

3.1 Material.....	36
-------------------	----

3.2 Experimental procedures	36
-----------------------------------	----

3.3 Equipment.....	37
--------------------	----

3.3.1 Rubidium high-frequency lamp.....	38
---	----

3.3.2 UV-Vis spectroscopy.....	39
--------------------------------	----

3.1.3 Electrical conductivity meter.....	40
--	----

3.3.4 Thermocouple.....	41
-------------------------	----

Chapter Four: Result and Discussion

4.1 The Result of temperature	44
-------------------------------------	----

4.2 conductivity results.....	47
-------------------------------	----

4.3 Results of optical properties	49
---	----

Chapter Five: Conclusion and Recommendation

5.1 Conclusion.....	52
5.2Recommendations.....	53
5.3 Problems.....	53
References	54
Appendices (A)	
.....	60
Appendices (B)	
.....	62

List of tables

No. table	Table title	Page
Table (2-1)	table shows types of non-ionizing radiation	13
Table (2-2)	Table RF source, frequency, power, and power density	23
Table (2-3)	Table RF sources: frequency, power, and power density	26
Table (2-4)	Table The major chemical and physical properties of water	28
Table (4.1)	Table Shows the conductivity Vs time for	37

	tube A &B (which exposed to RF 500 MHz, distance=10cm)	
Table (4.2)	Table shows the conductivity Vs time for tube C &D (which exposed to RF 900 MHz, distance=10cm)	37
Table (4.3)	Table shows the conductivity Vs time for tube E &B (which exposed to RF 500 MHz, distance=10cm)	37
Appendices (A)	Table shows the temperatures Vs time for tube A &B (which exposed to RF 500 MHz, distance=10cm)	60
Appendices (A)	Table shows the temperatures Vs time for tube C &D (which exposed to RF 900 MHz, (distance=10cm)	61
Appendices (A)	Table shows the temperatures Vs time for tube E &F (which exposed to RF 1800 MHz, distance=10cm)	61

List of figures

No. figure	Figure title	Page
Fig (1-1)	hydrogen bonds (1) between molecules of water	3
Fig (2-1)	shows electromagnetic spectrum	7
Fig (2-2)	shows different types of electromagnetic radiation	12
Fig (2-4)	Super turnstile Antenna, ENOME Anywhere, Broadcast antenna	21
Fig (2-5)	MRI Scanner	24
Fig (2-6)	Radiofrequency ablation (RFA) in liver cancer	26
Fig (3-1)	schematic diagram shows the setup of exposure system	27
Fig (3-2)	Rubidium high-frequency lamp	28
Fig (3-2)	Ultraviolet Spectroscopy (UV) Device	39
Fig (3-3)	an electrical conductivity meter	41
Fig (3-4)	Thermocouple connected to a multimeter displaying room temperature in °C	43

Fig(4.1)	shows the temperatures Vs time for tube A &B (which exposed to RF 500 MHz, distance=10cm)	44
Fig (4.2)	shows the temperatures Vs time for tube C &D (which exposed to RF 900 MHz, distance=10cm)	45
Fig(4.3)	shows the temperatures Vs time for tube E &B (which exposed to RF 1800 MHz, distance=10cm)	45
Fig (4.4)	shows the comparing between raising temperature of three groups	46
Fig (4-5)	shows the comparing between raising conductivity of three groups	48
Fig (4.5)	shows the absorption of tube A & B (which exposed to RF 500 MHz, distance = 10cm) against wavelength comparing with control (tube G)	49
Fig (4.6)	shows the absorption of tube C&D (which exposed to RF 900 MHz, distance=10cm) exposed 2 against wavelength comparing with control (tube G)	50
Fig (4.7)	shows the absorption of tube E&F (which exposed to RF 1800 MHz, distance=10cm) exposed 3 against wavelength comparing with control (tube G)	50
Appendices(B)	Other schematic diagram shows the setup of exposure system	62

\