The Technical Criteria for Producing Textile Filters Used in Purification the Drinking Water

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Abstract: Residues from various industries have increased with the great and fast technological development in the current era, which has increased the proportion of contamination of drinking water and thus increased concern about the urgent needs to purified it. This was the motivation for researchers in the field of textile industry for the production of filters used to purify drinking water, and there have been limited ways to produce filters was the most common method for producing filters using non-woven fabrics. And with the multiple studies for factors affecting on the functional efficiency for filters in the purification of drinking water for the purpose of access to the best types of filters was this research that focuses on the study of technical standards for the production of filters and also the textiles used in the purification of drinking water. Where this research deals drinking water standards and the executive specifications of samples filters used in the local market and the samples produced under this research, also has been conducting the necessary tests on them to study their functional efficiency in the purification of drinking water. All this tests were explained and results were discussed to distinguish between samples filters in terms of their efficiency in purify drinking water.
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1-Introduction:-

Textile industry is one of the oldest and most important industries known to mankind since ancient times to the current era, which saw the great technological development and multiple successive mutations, as invaded areas and different disciplines because of this development and the rapid scientific progress.

With this scientific development in various fields of scientific, industrial and technological on level of the world was the problem facing the whole world now, namely the (problem of environmental pollution), which became the haunt of all the human, to include this pollution (air, soil and water).

Hence the necessity for the use of modern technology, including the technology of textile industry to protect the mankind of this pollution especially pollution of water, as the mankind cannot live without clean water.

Hence the modern industries have tended to Manufacture water filters, including (textile filters) in order to purify the drinking water of various and multi-pollutants existing in it.

Currently observed that there are many types of these filters textile in the Egyptian markets, which may resulting in problem that this filters used in the domestic market some of which do not contain any production data, which confirms that they do not follow any standard specifications, what may affect the human by damage, instead of protecting him from pollution, hence the objectives of this study were concentrated as follows:-

-Study of the existing textile filters in the domestic market for the purification of drinking water.

-Provide an academic scientific study specialized to determine quality of design and production of textile filters used in the purification of drinking water in order to achieve the goal of using them.

- Reduce the economic costs arising from the import of these products from the textile filters.

2-Theoretical studies:-

2-1-Types of filters used in the purification of drinking water:-

There are several types of filters used in the purification of drinking water and can be identified as follows:

2-1-1-Simple installation filters:-

Containing a candle of ceramic or porcelain and prevent the passage of bacteria and impurities, and is one of the simplest and cheapest types of filters, and this kind called (Ceramic Filter).

2-1-2- Dual function water filters: -

Operating two main functions are:

First: remove impurities and bacteria and remove organic materials and inorganic through a carbon filter, where these materials cause odor and taste undesirable.

Second: remove residual organic pesticides that may reach the water sources, has not been fully removed in water purification plants, Figure (1) illustrates this type of filters.

2-1-3- Slow sand filters:-

This type of filter works to remove particles from the water by passing the water through about 36 inches of sand and by the process of adsorption these particles are removed, and this filter also works to remove the large amount of turbidity from drinking water, but the disadvantage of this type is large size. Figure (2) illustrates this type of filters.

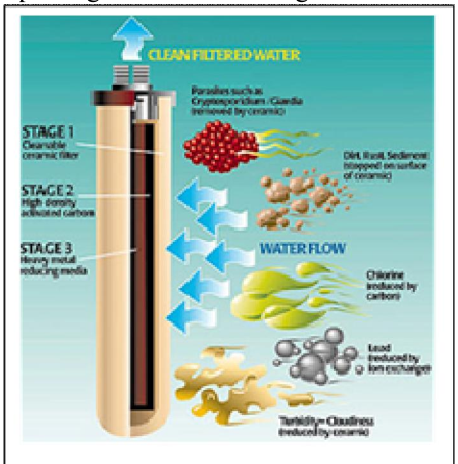

Figure (1): Dual function water filters

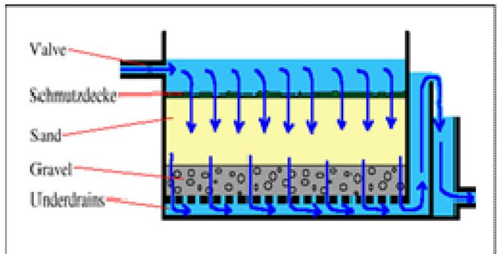

Figure (2): Slow sand filters

2-1-4- The composite filters: -

It consists of three main parts:

Part I: - dedicated to removal of suspended solids, which is a textile candle working on booking turbid materials and impurities present in drinking water. Figure (3) illustrates the textile candle.

Part II: - Made of carbon material.

Part III: - a dedicated unit for the issuance UV or bulb to produce ozone gas for the complete elimination of Microbiology that cause illness and sometimes present in the water. Figure (4) illustrates this type of filters.

Figure (3): The textile candle

Figure (4): The composite filter

There is also a new job in some of the filters, which work to reduce the concentration of salts and called that function as "reverse osmosis (RO), and believes that should avoid the use of this type in Egypt, because the Nile waters contain acceptable ratio of dissolved salts, and up to about 250 mg, a rate approved by the World Health Organization.

2-1-5- The updated filters used in drinking water purification: -

The updated filtration systems can be divided into several groups based on the type of media used in the filtration and the size of pollutants existing in water and required its removal. Of these devices **:**

- Mineral Filtration device and processing system compact, which was designed by Wang. The mineral filtration device remove solids, chemicals and residues of pesticides, and add other nutrients to the water[1].

- Membrane Filtration, which is a general term for a number of different separation processes. The membrane acts as a filter that allows water flow through, while removing suspended solids and other substances. Membrane process can be pressure driven or dependent on electrical potential gradients, concentration gradients, or other driving forces(1).

- Filtration Cartridges: Some water filters use a replaceable filter element which removes solid matter. The filter element has a limited service life, requiring frequent replacement. A combination water filter tank was designed by Chang and Chuang to remove settle able solids from water. The system could be used prior to filtration units to extend the service life of filter cartridges. The combination water filter tank allows the solid matter to settle to the bottom while the water passes through different segments of the tank which are separated by three transverse partition boards(1).

- Hybrid Filtration Systems: This technologies which combine coarse filtration with membrane filtration processes offer ease of operation and optimize the benefits of both types of filtration systems(1).

- Textile filters: have been using non-woven filtration media made of different raw materials, such as polyester, polyamide and polypropylene which have proven remarkably successful. Can be classified non-woven water filtration media into depth filters and surface filters which are type of adsorption or chemical absorption filters.

2-2- Implementation methods of non-woven filters:-

There is a wide range of industries that use non-woven media in the fields of liquid filtration, such as drinking water, food, beverages, biotechnology, medicine, fuel, hydraulic oils, and solvents. For each of these areas different type of contaminants that must be removed, Consequently there are many different types of non-woven media that can be used in these applications. The types of filter media are different with respect to materials within in their installation, operation, processing methods and performance characteristics, And can be classified into two distinct types based on their method of installation. Where is the first method is a dry laid process, which includes, carded, needle, spun bond and melt blown media. The second process uses a wet laid formation, which is generally done on a paper machine. Each process produces a media with unique properties that have advantage in different applications(2).

2-2-1- AirLaid Media:-

Dry laid process generally produce media with nominal ratings that are low cost and have high dirt holding capacities. Melt Blown media are one of the most versatile nonwovens for liquid filtration. Meltblown media is generally composed of a continuous network of self-bonded polypropylene, polyester or nylon microfibers produced with controlled fiber uniformity and density. The resulting media has a uniform porosity, does not shed fibers and contains no binders, adhesives or surfactants. Figure (5) illustrates a typical meltblown media with 10-20 um fibers(2).

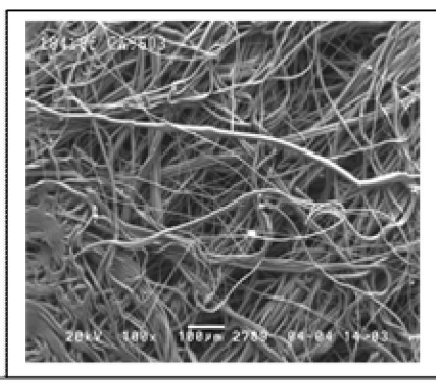

Figure (5): Meltblown fibers

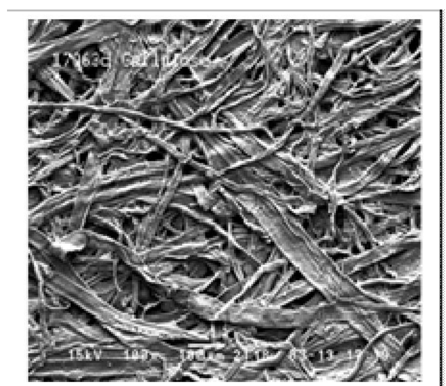

Figure (6): Wetlaid Cellulose

2-2-2- Wetlaid Media:

Wetlaid Media can be made with normal or absolute filter ratings. They typically contain benders which can have poor chemical and thermal resistance and high extractable when compared to air laid media, Including several types, among them:

-Cellulose based media is generally lower cost with normal efficiencies above 15 µm and low dirt holding capacity, cellulose fibers are coarse and flat which produces a dense, two-dimensional structure with high-pressure drop. Figure (6) illustrates a typical of wetlaid cellulose nonwoven media(2).

- The addition of synthetic to a cellulose sheet will significantly improve the filtration by opening up the structure and adding finer cylindrical fibers to the matrix which do not surface load as readily. Figure (7) illustrates a wetlaid cellulose/synthetic blend nonwoven media[2].

Figure (7): Wetlaid cellulose/synthetic blend nonwoven media

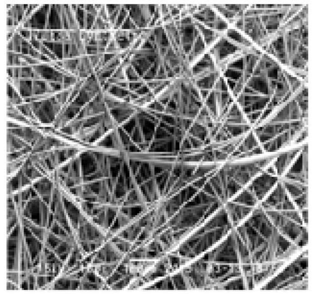

Figure (8): Wetlaid synthetic nonwoven media

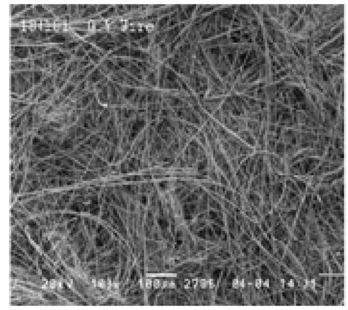

Figure (9): Wetlaid microglass media

- Wetlaid media produced with 100% synthetic or glass fibers will generally result in a very three-dimensional sheet with lower pressure drop and higher dirt holding capacity. figure (8) illustrates a typical of wetlaid synthetic nonwoven media[2].

- Microfiber glass media can be produced with the broadest range of filtration capability and efficiencies due to the wide range of fibers available. Figure (9) illustrates a wetlaid microglass media[2].

2-3- Standards and specifications for drinking water and domestic use: -

2-3-1- The objectives of the standards and specifications of drinking water: -

- Make pure water devoid of color, acceptable taste and smell.
- Get rid of the salts and harmful chemicals, which limit the utilization of this water in the hominid and industrial purposes.
- The elimination of pathogens that are transmitted through the water.
- Making water safe to drink and use of human and industrial purposes and food[3].

2-3-2- Egyptian standards and specifications that must be met in drinking water and domestic use:

Tables (1), (2), (3), (4) describes the standards and specifications that must be met in the Egyptian drinking water and domestic use approved by the Supreme Committee for Water on 7/5/2007.

Table (1): The physical properties:-

Property	Maximum allowable
Color	Nonexistent
Taste	Acceptable
Odor	Nonexistent
The turbidity	1 unit (NTU)
pH	6.5 - 8.5

Table (2): Inorganic materials that have an impact on palatability and household uses:-

NO.	Material	Maximum allowable (mg / 1 liter)
1	Dissolved salts at 120 ° C	1000
2	Overall hardship as $CaCo_3$	500
3	Calcium hardness as $CaCo_3$	350
4	Magnesium hardness as $CaCo_3$	150
5	Sulphates So_4	250
6	Chlorides Cl	250
7	Iron Fe	0.3
8	Manganese Mn	0.4
9	Copper Cu	2
10	Zinc Zn	3
11	Sodium Na	200
12	Aluminum Al	0.2

Table (3): Chemical material impact on public health: -

NO.	Material	Maximum allowable (mg / 1 liter)
1	Bullets Pb	0.001
2	Mercury Hg	0.001
3	Arsenic As	0.01
4	Cyanide Cn	0.05
5	Cadmium Cd	0.003
6	Selenium Se	0.01
7	Chromium Cr	0.05
8	Ammonia NH3	0.5
9	Nitrates NO3	45
10	Nitrite NO2	0.2
11	Fluorides F	0.8
12	Antimony SP	0.02
13	Barium Ba	0.7
14	Boron B	0.5
15	Nickel Ni	0.02
16	Moulibdinyum MO	0.07

Table (4): Microbiological standards:-

<table>
<tr><th>NO.</th><th>Type examination</th><th>Measurement method used</th><th>Maximum allowable</th></tr>
<tr><td>1</td><td>Total bacterial count</td><td>Poured plate method</td><td>At 37 ° C for 24 hours to no more than 50 cells / 1 cm^3.
At 22 ° C for 48 hours to no more than 50 cells / 1 cm^3.</td></tr>
<tr><td rowspan="3">2</td><td>Evidence of pollution:-
a- Total Coliform</td><td rowspan="3">(MF) or (MPN)</td><td>Must be 95% of the samples are being tested during the year completely free of E. coli in 100 cm^3 of the sample.
Any sample must not contain more than 3 cells / cm^3 100 that does not repeat it in two consecutive samples from the same source</td></tr>
<tr><td>b-Fecal coliform bacteria (Bassil colon Model)</td><td>All samples must be free of Bassil colon Model.</td></tr>
<tr><td>c- Streptococcus faecalis bacteria</td><td>All samples must be free of Streptococcus fecal microbe</td></tr>
<tr><td rowspan="2">3</td><td>Biological examination:-
1- When examining the presence of algae in the water</td><td></td><td>Makrustan ratio should not be more than 1 microgram / liter, and this analysis is done in the case of the emergence of sudden growth of blue-green algae</td></tr>
<tr><td>2- At microscopic examination of water</td><td></td><td>Water must be completely free of protozoa and all phases of worms cause of diseases and blue-green algae</td></tr>
</table>

As well as water should be free of radioactive material, a derivative of the subfamily alpha (A) 0.1 Mkrocury / liter, and the derivatives of the the subfamily Beta (B) 1.0 Mkrocury / liter[(4)].

2-4- Water pollution:-

Where the water that comes down to earth in the form of pure, free from microbial germs or other contaminants, but as a result of the evolution of massive industrial exposed to many of the problems which converts it into water unfit for drinking and human consumption. And considered most important sources of water pollution: rain water pollution, where the factories launches vapors and gases, and the result is what is called acid rain. As the water is contaminated with many different pollutants, for example water contaminated by sewage and residues causing the presence of pathogens such as bacteria, viruses and parasites. Also water contaminated by various chemical cleaners and some metal elements such as lead, mercury, phosphates, nitrates, chlorine, and oil.

3- Experimental work:-

This research aims to study the textiles filters in the domestic market for the purification of drinking water, and production of samples under search comprehensive for most of the variables affecting the quality of the filter, which in turn affects the drinking water purification, and this provides specialized academic scientific study to determine standards for the design quality and production of textile filters, used in the purification of drinking water in order to achieve the goal of use.

3-1- Samples were collected from the local market: -

Where it was a comprehensive study of the local market to assemble all textile filters samples that are used in drinking water purification, and resulted in a number four filters are as follows: -

The first sample: Is a filter of type (Depth Filters) in cylindrical shape, was manufactured in a manner non-woven structural (AirLaid), made from Polypropylene, with a smooth surface,, spaces interfacial 5 micron. the diameter of filter is 5.5 cm, its thickness of 1.5 cm and weighs filter 81.62 gram. Figure (10) shows the first filter.

Figure (10): The first sample

Figure (11): The second sample

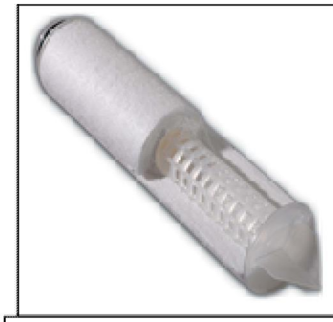

Figure (12): The plastic cylinder

The second sample: Is a filter of type (Depth Filters) in cylindrical shape, was manufactured in a manner non-woven structural (AirLaid), made from Polypropylene, its surface has cavities (winding), cavity width 8 ml, spaces interfacial 5 microns, the diameter of filter 6 cm, its thickness of 1.7 cm and weighs filter 123.08 grams, Figure (11) shows the second filter.

The third sample: Is a filter of type (Depth Filters) in cylindrical shape, this filter is made of polypropylene yarns, which has been winding this yarn with spaces interfacial 5 microns on a plastic cylinder made of polypropylene its diameter of 3.5 cm with rectangular openings help to water filtration, weigh of the cylinder 26.03 grams, figure (12) shows this cylinder. Weighs filter 101.81 grams, Figure (13) shows the third filter.

Figure (13): The third sample

Figure (14): The fourth sample

The fourth sample: Is a filter of type (Depth Filters) in cylindrical shape, was manufactured in a manner non-woven structural (AirLaid), made from Polypropylene, with a smooth surface,, spaces interfacial 5 micron. the diameter of filter is 6.8 cm, its thickness of 2 cm and weighs filter 118.9 gram. Figure (14) shows the fourth filter.

3-2- The samples produced under study:

Number of 8 samples were implemented under this research (numbered from 5 to 12). Samples from 5 to 11 are all made up of three layers of, the first layer and the third were made from knitted fabric, the first layer adjacent to the surface of the plastic cylinder, the third layer is the outer layer of the filter, and the second layer are carried from non-woven fabric, and it is the middle layer of the filter.

Knitted fabric has been implemented on a weft knitting rectangular machine gauge 10 needle / inches. The non-woven fabric been implemented on the needle punching machine from Polypropylene, weighs 400 g/m^2, thickness of 2.59 mm. Table (5) illustrates the specification of these samples.

Ten second sample consisting of two layers only. The first layer (internal) is a filter of type (Depth Filters) in cylindrical shape, was manufactured in a manner non-woven structural (AirLaid), made from Polypropylene, its surface has cavities (winding), cavity width 8 ml, spaces interfacial 5 microns, the diameter of filter 6 cm, its thickness of 1.7 cm and weighs filter 123.08 grams.

The second layer (external) of the material polyester, made from knitted fabric on a weft knitting rectangular machine gauge 10 needle / inches, textile structure was jersey on one face, yarn count was 800 denier, its thickness of 0.88 cm and weighs 375 grams.

3-3- Laboratory Testing for fabric weight and thickness:-

3-3-1- Determination of fabric weight:

This test was carried out by using Metter PI 200 according to the American Standard specifications of (ASTM-D3776-85) (8).The average of 3 readings for each sample was used[5].

3-3-2-Determination of fabric thickness:

This test was carried out by using Helios Tester according to the American Standard specifications of (ASTM-D1777-64) (9). The average of 5 readings for each sample was used[6].

Table (5): The specification of samples (from 5 to 11) produced under study:-

Sample NO.	The first layer and the third					Type of filter
	Material	Count denier	Textile structure	Thickness mm	Weight g/ m2	
5	Polyamide	800	jersey on one face	1.2	225	Cylindrical
6	Polyamide	800	Normal filled Knitting (All needles into the job)	1.68	675	Cylindrical
7	Polyamide	800	Derby 1:1	1.81	450	Cylindrical
8	Polyester	800	jersey on one face	0.88	375	Cylindrical
9	Polyester	800	Normal filled Knitting (All needles into the job)	1.68	625	Cylindrical
10	Polyester	800	Derby 1:1	1.72	525	Cylindrical
11	Polyamide	800	Normal Knitting	1.68	675	Flat

3-4- Experimental practical:-

Necessary tests were conducted on these samples to measure their efficiency to purify drinking water are as follows: -

3-4-1- Test the measurement of water turbidity:-

Turbidity is the presence of a cloud or impurities within the water and is caused by small particles (objects suspended in water) and often do not see with the naked eye, which is something like smoke in the air. The process of measuring turbidity is an essential process in testing water quality where it is possible that the water containing the substances hanging in many different sizes, while some of the objects to be heavy and large enough to precipitate out quickly on the bottom if left for a period of not moved, as for the exact objects they may precipitate slowly and may not precipitate at all if the sample is moved regularly, or if these particles slimy, these tiny objects lead to give liquid turbidity form.

There are several ways to measure the turbidity of the water, including FTU (Formazzin turbidity unit), and FNU by the International Standards Organization ISO, And NTU (Nephelometric unit) for turbidity, and this a unit that was used in this test in This research, which relies on measuring the ratio of the reflected light passing through the sample and vary the light intensity according to the purity of the water, and it was measured by device HACH[7].

3-4-2- Test the measurement of the proportion of dissolved salts (TDS):-

The human body needs some salts such as calcium, sodium and other materials, a so-called non-organic materials. This inorganic substances present in the water until the water does not lose its taste and becomes has bitter taste, and is harmful to human health as the World Health Organization defines, these inorganic compounds such as:-

Metals such as sodium, magnesium, potassium, calcium and other from the rest of minerals, basal such as (carbonate and bicarbonate), and total hardness (calcium and magnesium hardness), and other materials such as (chlorides, sulfates, ammonia, nitrite, nitrate, phosphate, silicates and fluorides), these inorganic materials are to be ionized in the water and form the most of the salts dissolved in water (TDS), and the measurement the total can be by using electrical conductivity[8]. Electrical conductivity expresses the ratio of total dissolved salts in the water, where it is the more of the salts in the water the increasing of electrical conductivity of this water, and electrical conductivity of the water depends on: -

A - Total Dissolved Solids

B - The water temperature

C - the concentration of ions

D - equivalent to the ions.

As needed to measure each of these inorganic materials separately to see its focus several devices used to it, and what was used to determine the concentration of each element alone was as follows:-

-Methods of calibration using burettes to estimate the concentrations of each of the (Total hardness, calcium hardness, magnesium, basal, and chlorides)

- Appointment of the concentration Ca, Mg using Atomic Absorption Spectrometer.

- Either each of the (ammonia, nitrate, nitrite, sulfate, phosphate, fluorides and silicates) they have the ways to be measured using a device called (VIS - UV Spectrometer) [8].

3-4-3-Test of analysis heavy metal:-

Soluble heavy metals of any kind were measured using devices called Spectrophotometer for the analysis of inorganic elements in water using visible light and direct reading of the concentration, and it is the latest devices in the field of measurement of heavy metals such as lead, mercury and chromium in fresh water, which could pose a threat to human health [8].

3-4-4- Test (pH): -

pH (hydrogen ion concentration), and it is a negative decimal logarithm of the hydrogen ion concentration and is expressed in numbers from zero to 14, where numbers less than 7 indicate that the water acidic and numbers greater than 7 indicate that the water base, the number 7 indicates that the water is neutral at a temperature of 25 ° C, it is the optimal number of natural potable water, but the water remains valid if increased or decreased a little bit about the number 7. but it can be a simple change in pH leads to eliminate the whole type of organisms, the pH can range from zero to very strong acids such as hydrochloric acid (HCl), and 14 for strong bases such as sodium hydroxide (NaOH). and pure water containing an equal number of ions (H +) ions (OH-) is therefore considered neutral. The World Health Organization has identified values ranging from 6.5 to 8.5 for the pH of drinking water.

3-4-5- Test of analysis Microbiology:-

Water is a poor environment in terms of food, but it allows the growth and reproduction of microbes, The bacteria in the water are divided into:

1-Normal group

2- Group up to water from the soil, air and waste during runoff the rainfall and sewage [9].

Microbial contaminants of water: -

Sewage is the most important source of drinking water contamination with microbes nurse.

The most important transmitted diseases sewage are Typhoid - Shigella – Cholera.

Indicator of Microorganisms: If that microbes are found in water, they are considered a Indicator of the contamination of water with sewage, or other objects contaminated. It is an Indicator of the presence of pathogenic microbes, therefore we have been conducting this test, which is so-called fecal coliform, by using the nurseries for bacterial farms when temperatures appropriate for each type and preparation of bacterial farms in a sterile atmosphere, as well as microscopes to examine water samples and study the algae and organisms and counted if applicable, This test follows the specification (CDW/W03/Test.P/02) [8].

4 -Results and discussion-:

Results of experimental tests carried out on the produced samples were statistically analyzed and represented in the following tables and graphs.

Table (6) Results of dimensional tests applied to samples under study:-

S. NO.	Weight (grams)	Thickness (Cm)	Area (Cm^2)	Volume (Cm^3)
1	81.62	1.5	293.4	440.2
2	123.08	1.7	303.6	516.1
3	101.81	0.7	227.7	19.3
4	118.9	2	328.9	657.8
5	44.87	1	253	253
6	130.59	1.3	275	357.5
7	116.87	1.2	275	330
8	133.97	1.4	275	385
9	111.57	1.3	303.6	394.6
10	150.67	1.2	303.6	364.3
11	26.61	1.4	89.25	124.9
12	220	2.7	394.6	1080

Table (7) Results of Heavy metal tests applied to samples under study:-

S. NO.	Results of Heavy metal tests applied to samples under study										
	Ca Mg/ kg	Mg Mg/ kg	Na Mg/ kg	K Mg/ kg	Hco3 Mg/ kg	Cl Mg/ kg	So4 Mg/ kg	Zn Mg/ kg	Fe Mg/ kg	Mn Mg/ kg	Cu Mg/ kg
The maximum allowable	350	150	200	6.00	500	250	250	3.0	0.3	0.4	2
Water sample before filtration	104	52.8	131.1	5.46	500.2	156.2	64.3	0.05	0.04	0.04	0.02
1	108	52.8	101.2	5.07	500.2	170.4	63.8	0.05	0.04	0.03	0.01
2	120	38.4	96.6	5.07	524	163.3	15.9	0.05	0.04	0.03	0.02
3	124	36	92	6.24	506.3	170.4	12.5	0.06	0.04	0.03	0.01
4	122	37.2	94.3	5.46	518.5	159.8	21.2	0.05	0.05	0.04	0.02
5	118	38.4	96.6	5.07	512.4	163.3	20.6	0.05	0.04	0.03	0.01
6	120	38.4	96.6	5.46	512.4	166.9	21.2	0.06	0.04	0.03	0.01
7	120	37.2	98.9	5.46	500.2	170.4	25.	0.06	0.05	0.03	0.01
8	96	40.8	135.7	5.07	439.2	156.2	64.3	0.05	0.04	0.04	0.02
9	100	38.4	124.2	5.46	439.2	134.9	71	0.06	0.05	0.04	0.02
10	104	36	119.6	5.07	439.2	127.8	70.5	0.05	0.04	0.03	0.01
11	119	39.5	97.6	5.59	513	160.7	22	0.05	0.05	0.03	0.01
12	88	43.1	131.1	5.07	439.2	142.1	64.3	0.05	0.04	0.03	0.01

4-1- The effect of filter volume on the weight property: -

Figure (15) shows the effect of the filter volume (cm^3) on the filter weight in grams, where evidenced a positive relationship between the volume of the filter (cm^3) and the filter weight in grams, and that for all types of filters under study. Table (9) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the weight of the filter (grams) where evidenced presence correlation between the volume the filter and the measured property, this is due to the increase in volume means increasing the diameter of the filter cylinder (cm), especially with the stability of the length of the filter, means that the area of the filter increases and that is equal to ($2\pi r \times$ length) and this in turn leads to increase the volume of the filter is equal to (an area of filter × thickness), which leads to weight gain.

Table (8) Results of TDS, pH Analysis Turbidity Analysis and Microbiology analysis (Fecal Coliform) tests applied to samples under study:-

S. NO.	TDS	pH	Turbidity Analysis (NTU)	Microbiology analysis Fecal Coliform CFU/100ml
The maximum allowable	1000	6.5 – 8.5	1 Unit (NTU)	Be completely free <1
Water sample before filtration	1009	7.1	1.14	290
1	1002	6.9	0.96	Not acceptable
2	965	6.8	0.33	<1
3	948	7	0.4	<1
4	959	6.9	0.35	Not acceptable
5	955	7	0.36	<1
6	962	7	0.46	Not acceptable
7	959	7.1	0.55	Not acceptable
8	968	7.2	0.58	Not acceptable
9	942	7	0.64	Not acceptable
10	931	7.1	0.38	Not acceptable
11	954	7.1	0.49	Not acceptable
12	943	7.1	0.21	Not acceptable

Table (9): The correlation coefficient between the volume property of filter (cm 3) and the amount of weight (g):-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	$y = 0.1826x + 41.814$	R = 0.8590
Samples of the domestic market (Filter Weight Control)	$yc = 0.04x + 88.629$	R c= 0.4440

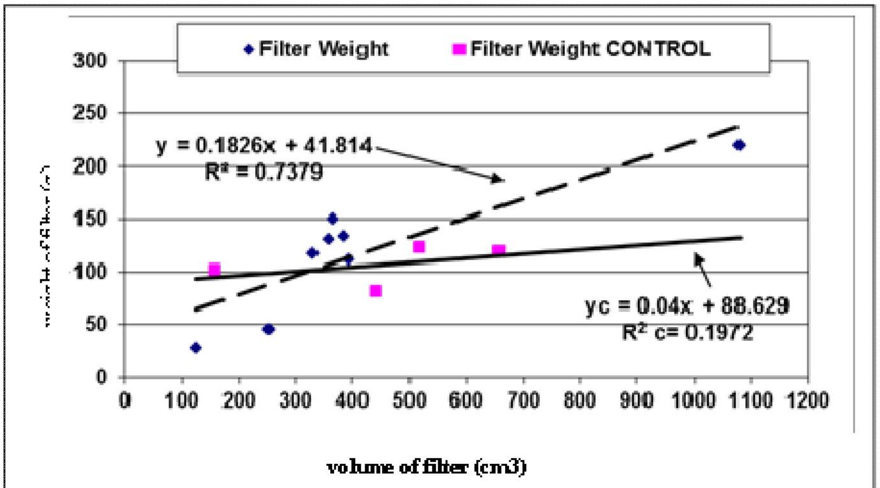

Figure (15) Correlation coefficient between the volume property of filter (cm^3) and its weight (g)

4-2- The effect of filter volume on thickness property: -

Figure (16) shows the effect of the filter volume (cm3) on the filter thickness in cm, Where it is clear the existence of a positive correlation between the volume of the filter (cm3) and the thickness of the filter (cm) to all types of filters under study whether the domestic market filters or filters produced under research. Table (10) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the thickness of the filter (cm), where evidenced presence correlation between the volume the filter and the measured property, this is due to the increase in volume means increasing the thickness of the filter cylinder (cm), especially with the stability of the length of the filter, and this is because the volume of the filter is equal to (an area of filter × thickness).

Table (10): The correlation coefficient between the volume property of filter (cm 3) and its thickness (cm):-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = 0.0017x + 0.7374	R = 0.9208
Samples of the domestic market (Filter Weight Control)	yc = 0.0026x + 0.3025	R c= 0.9975

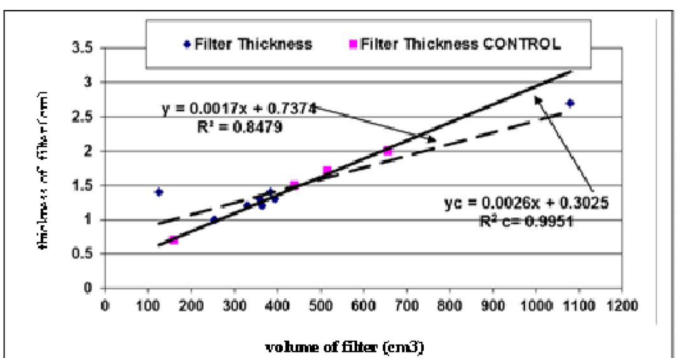

Figure (16) Correlation coefficient between the volume property of filter (cm^3) and its thickness (cm).

4-3- The effect of filter volume on the proportion of turbidity (NTU):-

Figure (17) shows the effect of the filter volume (cm3) on the proportion of turbidity and impurities present in drinking water (NTU), Where it is clear the existence of an inverse relationship between the volume of the filter (cm3) and the proportion of turbidity (NTU) to all types of filters under study whether the domestic market filters or filters produced under research. Table (11) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of turbidity in the water (NTU), where evidenced presence correlation between the volume the filter and the measured property, this is because when it is increasing the volume of the filter increases its area and thus increases its thickness as mentioned above, and therefore increases the textile distance constituents the filter membrane which is responsible for the nomination process, and which passes through it the water required purify it, and thus increases the ability of the filter to a reservation of a greater proportion of impurities and turbidity in the water.

Table (11): The correlation coefficient between the volume property of filter (cm 3) and the proportion of turbidity (NTU):-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = -0.0003x + 0.5818	R = 0.6140
Samples of the domestic market (Filter Weight Control)	yc= -0.0001x + 0.5691	Rc= 0.0927

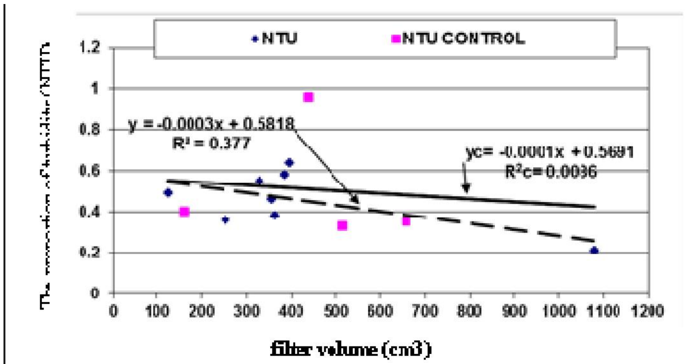

Figure (17): Correlation coefficient between the volume property of filter (cm^3) and the proportion of turbidity (NTU).

4-4- The effect of filter volume on the proportion of calcium (Ca) (Mg / Kg) in water:-

Figure (18) shows the effect of the filter volume (cm3) on the proportion of calcium (Ca) (Mg / Kg) in water, Where it is clear the existence of a weak inverse relationship between the volume of the filter (cm3) and the proportion of calcium (Ca) (Mg / Kg) in water to the domestic market filters (Filter Weight Control), but the case of filters produced under the research (Filter Weight) is clear to us the existence of an inverse relationship, but also more effective than filters for the domestic market. All in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (12) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of calcium (Ca) (Mg / Kg) in the water, where evidenced presence correlation between the volume the filter and the measured property, this is because when it is increasing the volume of the filter increases its area and thus increases its thickness as mentioned before, and therefore increases the textile distance constituents the filter membrane which is responsible for the nomination process, and which passes through it the water required purify it, and thus increases the ability of the filter to booking a larger proportion of these metals in the water.

Table (12): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of calcium (Ca) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = -0.0337x + 121.97	R = 0.7533
Samples of the domestic market (Filter Weight Control)	yc = -0.0051x + 120.75	Rc = 0.1479

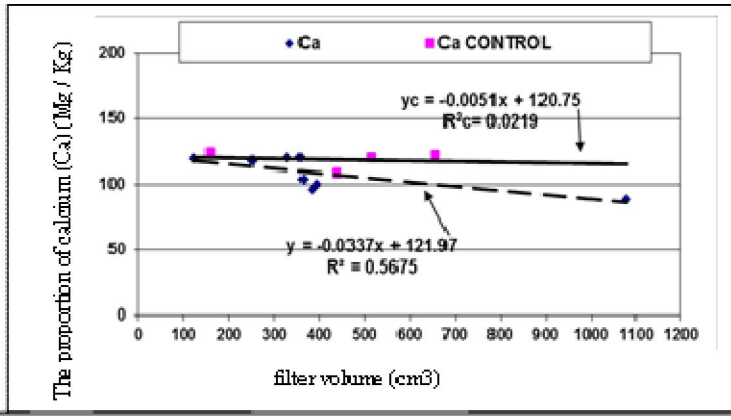

Figure (18): Correlation coefficient between the volume property of the filter (cm^3) and the proportion of calcium (Ca) (Mg / Kg) in water.

4-5 The effect of filter volume on the proportion of Magnesium (Mg) (Mg / Kg) in water:-

Figure (19) shows the effect of the filter volume (cm3) on the proportion of Magnesium (Mg) (Mg / Kg) in water, Where it is clear the existence of a weak positive relationship between the volume of the filter (cm3) and the proportion of Magnesium (Mg) (Mg / Kg) in water to all types of filters under study whether the domestic market filters or filters produced under research, all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (13) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of Magnesium (Mg) (Mg / Kg) in water, where evidenced presence correlation between the volume the filter and the measured property.

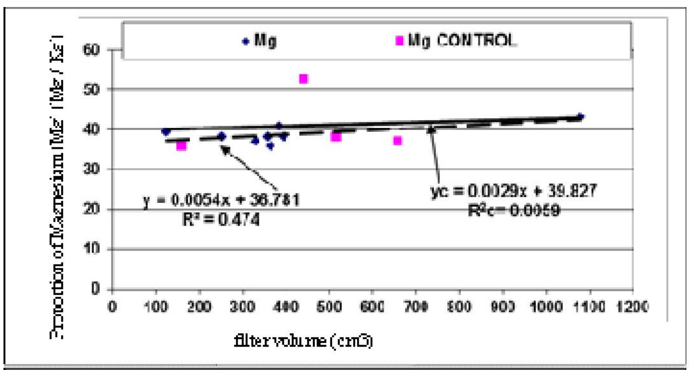

Figure (19): Correlation coefficient between the volume property of the filter (cm^3) and the proportion of Magnesium (Mg) (Mg / Kg) in water.

Table (13): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of Magnesium (Mg) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = 0.0054x + 36.781	R = 0.6884
Samples of the domestic market (Filter Weight Control)	yc = 0.0029x + 39.827	Rc= 0.0768

4-6 The effect of filter volume on the proportion of Sodium (Na) (Mg / Kg) in water:-

Figure (20) shows the effect of the filter volume (cm3) on the proportion of sodium (Na) (Mg / Kg) in water, Where it is clear the existence of a weak positive relationship between the volume of the filter (cm3) and the proportion of sodium (Na) (Mg / Kg) in water to the domestic market filters (Filter Weight Control), but the case of filters produced under the research (Filter Weight) is clear to us the existence of a positive relationship, but also more effective than filters for the domestic market, all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (14) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of sodium (Na) (Mg / Kg) in water, where evidenced presence correlation between the volume the filter and the measured property.

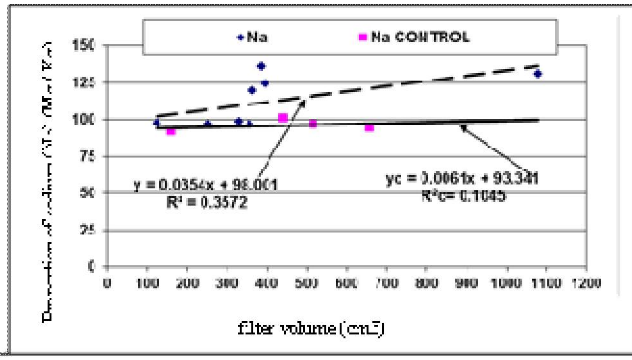

Figure (20): The correlation coefficient between the volume property of the filter (cm^3) and the proportion of sodium (Na) (Mg / Kg) in water

Table (14): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of sodium (Na) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = 0.0354x + 98.001	R = 0.5976
Samples of the domestic market (Filter Weight Control)	yc = 0.0061x + 93.341	Rc = 0.3232

4-7 The effect of filter volume on the proportion of Potassium (K) (Mg / Kg) in water:-

Figure (21) shows the effect of the filter volume (cm3) on the proportion of Potassium (K) (Mg / Kg) in water, where it is clear the existence of an inverse relationship between the volume of the filter (cm3) and the proportion Potassium (K) (Mg / Kg) in water to all types of filters under study whether the domestic market filters or filters produced under research, all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (15) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of Potassium (K) (Mg / Kg), where evidenced presence correlation between the volume the filter and the measured property, this is because when it is increasing the volume of the filter increases its area and thus increases its thickness as mentioned before, and therefore increases the textile distance constituents the filter membrane which is responsible for the nomination process, and which passes through it the water required purify it, and thus increases the ability of the filter to booking a larger proportion of these metals in the water.

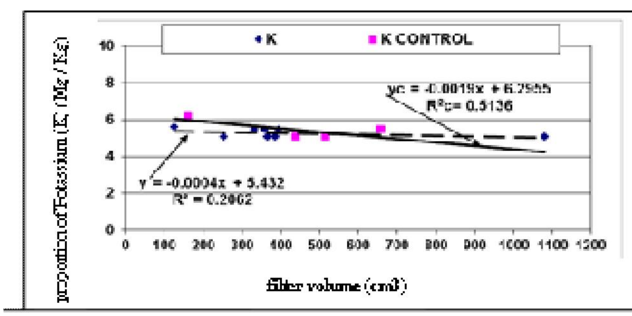

Figure (21): The correlation coefficient between the volume property of the filter (cm^3) and the proportion of Potassium (K) (Mg / Kg) in water.

Table (15): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of Potassium (K) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = -0.0004x + 5.432	R = 0.4540
Samples of the domestic market (Filter Weight Control)	yc = -0.0019x + 6.2955	Rc = 0.7166

4-8 The effect of filter volume on the proportion of Ion bicarbonate (Hco3) (Mg / Kg) in water:-

Figure (22) shows the effect of the filter volume (cm3) on the proportion of Ion bicarbonate (Hco3) (Mg / Kg) in water, Where it is clear the existence of a weak positive relationship between the volume of the filter (cm3) and the proportion of ion bicarbonate (Hco3) (Mg / Kg) in water to the domestic market filters (Filter Weight Control), but the case of filters produced under the research (Filter Weight) is clear to us the existence of an inverse relationship, It was found that some of them in the limits as stated in the specification (190 to 2007) for safe drinking water, the others are higher than the permissible limits in the specification. Table (16) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of ion bicarbonate (HCO_3) (Mg / Kg), where evidenced presence correlation between the volume the filter and the measured property.

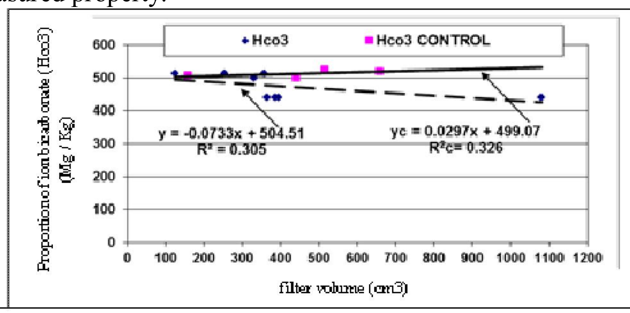

Figure (22): The correlation coefficient between the volume property of the filter (cm^3) and the proportion of ion bicarbonate (Hco3) (Mg / Kg) in water.

Table (16): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of ion bicarbonate (HCO_3) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = -0.0733x + 504.51	R = 0.5522
Samples of the domestic market (Filter Weight Control)	yc = 0.0297x + 499.07	Rc = 0.5709

4-9 The effect of filter volume on the proportion of Chlorine (Cl) (Mg / Kg) in water:-

Figure (23) shows the effect of the filter volume (cm3) on the proportion of Chlorine (Cl) (Mg / Kg) in water, where it is clear the existence of an inverse relationship between the volume of the filter (cm3) and the proportion Chlorine (Cl) (Mg / Kg) in water to all types of filters under study whether the domestic market filters or filters produced under research, all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (17) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of Chlorine (Cl) (Mg / Kg), where evidenced presence correlation between the volume the filter and the measured property.

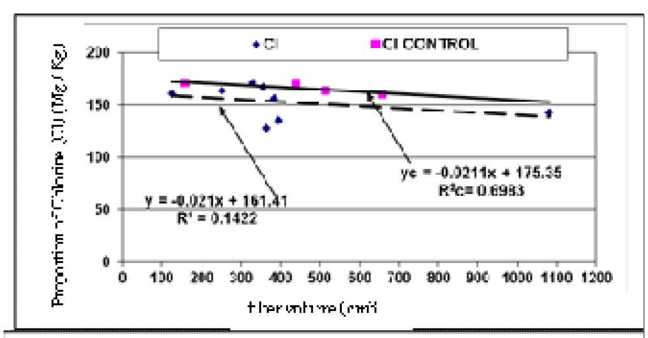

Figure (23): The correlation coefficient between the volume property of the filter (cm^3) and the proportion of Chlorine (Cl) (Mg / Kg).

Table (17): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of Chlorine (Cl) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = -0.021x + 161.41	R = 0.3770
Samples of the domestic market (Filter Weight Control)	yc = -0.0211x + 175.35	Rc= 0.8356

4-10 The effect of filter volume on the proportion of Sulphates (So4) (Mg / Kg) in water:-

Figure (24) shows the effect of the filter volume (cm3) on the proportion of Sulphates (So4) (Mg / Kg) in water, where it is clear the existence of a positive relationship between the volume of the filter (cm3) and the proportion Sulphates (So4) (Mg / Kg) in water to all types of filters under study whether the domestic market filters or filters produced under research, all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (18) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of Sulphates (So4) (Mg / Kg), where evidenced presence correlation between the volume the filter and the measured property.

Table (18): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of Sulphates (So4) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = 0.0424x + 27.534	R = 0.4971
Samples of the domestic market (Filter Weight Control)	yc = 0.0148x + 21.794	Rc = 0.1296

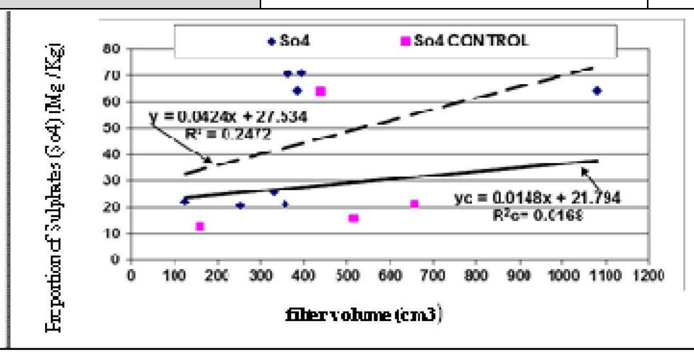

Figure (24):The correlation coefficient between the volume property of the filter (cm^3) and the proportion of Sulphates (So4) (Mg / Kg).

4-11- The effect of filter volume on the proportion of Zinc (Zn) (Mg / Kg) in water:-

Figure (25) shows the effect of the filter volume (cm3) on the proportion of Zinc (Zn) (Mg / Kg) in water, where it is clear the existence of an inverse relationship between the volume of the filter (cm3) and the proportion of Zinc (Zn) (Mg / Kg) in water to all types of filters under study whether the domestic market filters or filters produced under research, all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (19) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of Zinc (Zn) (Mg / Kg), where evidenced presence correlation between the volume the filter and the measured property, this is because when it is increasing the volume of the filter increases its area and thus increases its thickness as mentioned before, and therefore increases the textile distance constituents the filter membrane which is responsible for the nomination process, and which passes through it the water required purify it, and thus increases the ability of the filter to booking a larger proportion of these metals in the water.

Table (19): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of Zinc (Zn) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = -3E-06x + 0.0548	R = 0.1469
Samples of the domestic market (Filter Weight Control)	yc = -2E-05x + 0.062	Rc = 0.9028

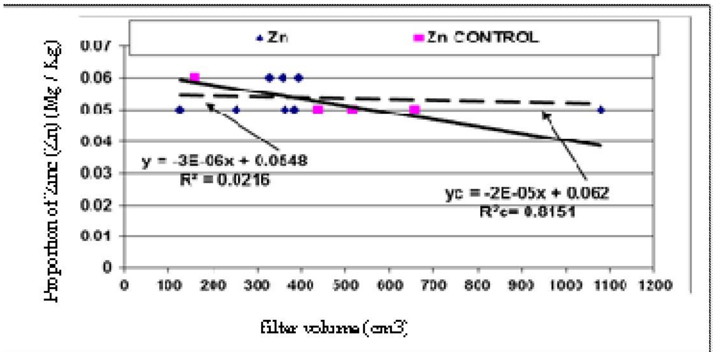

Figure (25): The correlation coefficient between the volume property of the filter (cm^3) and the proportion of Zinc (Zn) (Mg / Kg)

4-12- The effect of filter volume on the proportion of Iron (Fe) (Mg / Kg) in water:-

Figure (26) shows the effect of the filter volume (cm3) on the proportion of Iron (Fe) (Mg / Kg) in water, Where it is clear the existence of a weak positive relationship between the volume of the filter (cm3) and the proportion of Iron (Fe) (Mg / Kg) in water to the domestic market filters (Filter Weight Control), but the case of filters produced under the research (Filter Weight) is clear to us the existence of an inverse relationship, and all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (20) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of Iron (Fe) (Mg / Kg), where evidenced presence correlation between the volume the filter and the measured property.

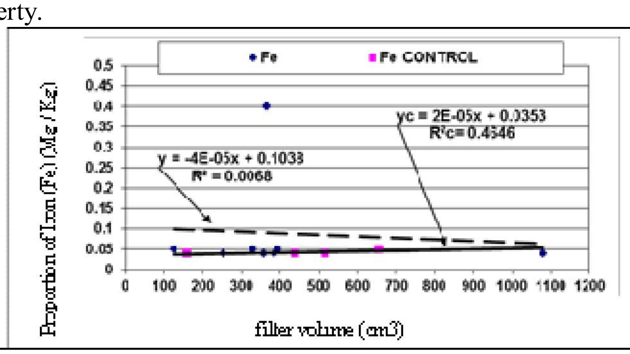

Figure (26): The correlation coefficient between the volume property of the filter (cm^3) and the proportion of Iron (Fe) (Mg / Kg).

Table (20): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of Iron (Fe) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = -4E-05x + 0.1038	R = 0.0824
Samples of the domestic market (Filter Weight Control)	yc = 2E-05x + 0.0353	Rc = 0.6816

4-13- The effect of filter volume on the proportion of Manganese (Mn) (Mg / Kg) in water:-

Figure (27) shows the effect of the filter volume (cm3) on the proportion of Manganese (Mn) (Mg / Kg) in water, Where it is clear the existence of a positive relationship between the volume of the filter (cm3) and the proportion of Manganese (Mn) (Mg / Kg) in water to the domestic market filters (Filter Weight Control), but the case of filters produced under the research (Filter Weight) is clear to us the existence of a weak inverse relationship, and all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (21) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of Manganese (Mn) (Mg / Kg), where evidenced presence correlation between the volume the filter and the measured property.

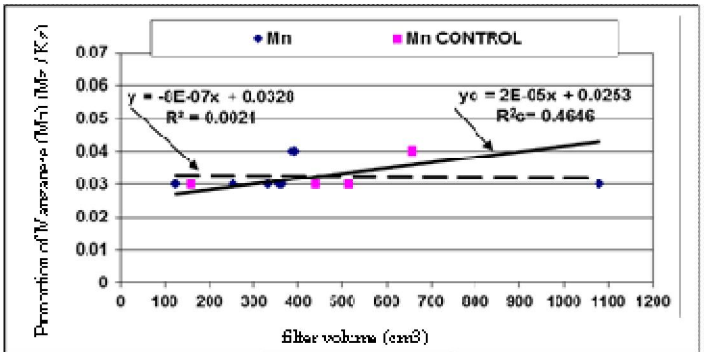

Figure (27): The correlation coefficient between the volume property of the filter (cm^3) and the proportion of Manganese (Mn) (Mg / Kg).

Table (21): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of Manganese (Mn) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = -8E-07x + 0.0328	R = 0.0458
Samples of the domestic market (Filter Weight Control)	yc = 2E-05x + 0.0253	Rc = 0.6816

4-14- The effect of filter volume on the proportion of Copper (Cu) (Mg / Kg) in water:-

Figure (28) shows the effect of the filter volume (cm3) on the proportion of Copper (Cu) (Mg / Kg) in water, Where it is clear the existence of a positive relationship between the volume of the filter (cm3) and the proportion of Copper (Cu) (Mg / Kg) in water to the domestic market filters (Filter Weight Control), but the case of filters produced under the research (Filter Weight) is clear to us the existence of a weak inverse relationship, and all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (22) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of Copper (Cu) (Mg / Kg), where evidenced presence correlation between the volume the filter and the measured property.

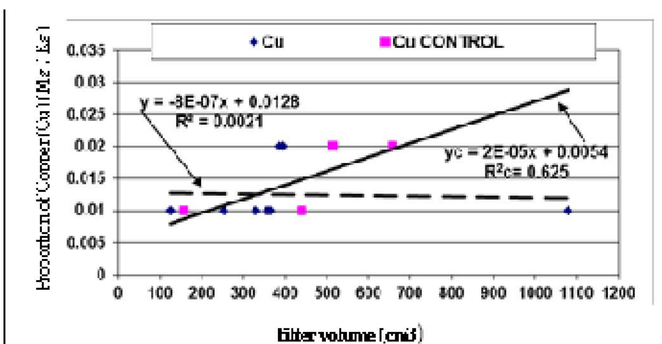

Figure (28): The correlation coefficient between the volume property of the filter (cm^3) and the proportion of Copper (Cu) (Mg / Kg).

Table (22): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of Copper (Cu) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = -8E-07x + 0.0128	R = 0.0458
Samples of the domestic market (Filter Weight Control)	yc = 2E-05x + 0.0054	Rc = 0.7905

4-15- The effect of filter volume (cm 3) on the proportion of dissolved salts (TDS) (Mg / Kg) in water:-

Figure (29) shows the effect of the filter volume (cm3) on the proportion of dissolved salts (TDS) (Mg / Kg) in water, Where it is clear the existence of a positive relationship between the volume of the filter (cm3) and the proportion of dissolved salts (TDS) (Mg / Kg) in water to the domestic market filters (Filter Weight Control), but the case of filters produced under the research (Filter Weight) is clear to us the existence of a weak inverse relationship, and all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (23) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of dissolved salts (TDS) (Mg / Kg), where evidenced presence correlation between the volume the filter and the measured property.

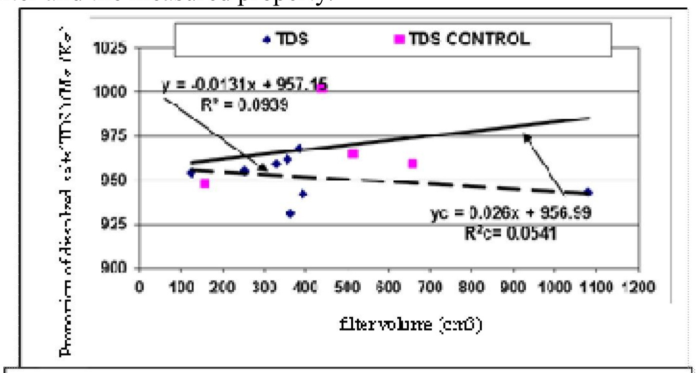

Figure (29): The correlation coefficient between the volume property of the filter (cm^3) and the proportion of dissolved salts(TDS) (Mg /

Table (23): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of dissolved salts (TDS) (Mg / Kg) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = -0.0131x + 957.15	R = 0.3064
Samples of the domestic market (Filter Weight Control)	yc = 0.026x + 956.99	Rc = 0.2325

4-16- The effect of filter volume on the proportion of (PH) in water:-

Figure (30) shows the effect of the filter volume (cm3) on the proportion of (PH) in water, where it is clear that there lack effect of the volume of the filter (cm3) on the proportion of (PH) in water to all types of filters under study whether the domestic market filters or filters produced under research, all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. Table (24) shows the value of the correlation coefficient (R) and the equations of the regression line (Y) (equation of first degree) of the filters in the domestic market and filters produced under study where representing (X) the volume of the filter (cm3) and (Y) represents the proportion of (PH), Where it is clear there is no correlation between the volume of the filter and the measured property, due to the absence of any acid or alkali in the raw material made from them all filters under study.

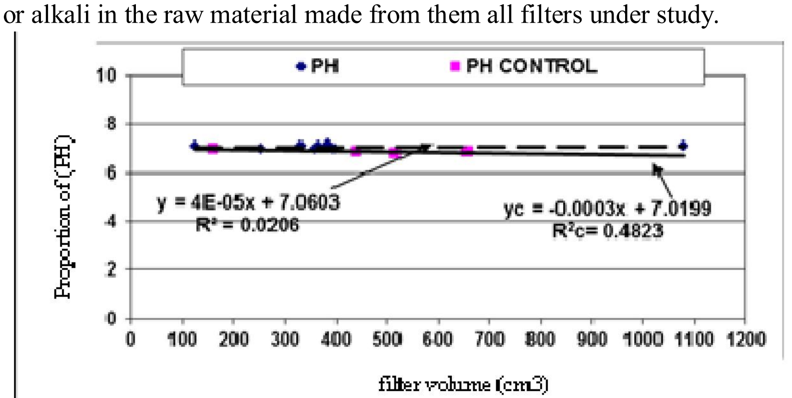

Figure (30): The correlation coefficient between the volume property of the filter (cm^3) and the proportion of (PH) in water.

Table (24): The correlation coefficient between the volume property of the filter (cm 3) and the proportion of (PH) in water:-

Filter type	Equation of the straight line (y)	Correlation coefficient (R)
Samples produced under research (Filter Weight)	y = 4E-05x + 7.0603	R = 0.1435
Samples of the domestic market (Filter Weight Control)	yc = -0.0003x + 7.0199	Rc = 0.6944

4-17- The effect of filter volume on the presence of Fecal Coliform CFU/100ml in water:-

Table (8) shows the effect of the filter volume on the presence of Fecal Coliform CFU/100ml in water, that filters number 2,3,5 succeeded in removing all the bacteria in the water by 100%, while other filters did not achieve a positive result acceptable, this is due to the difference in the type the filter and the difference in its composition constructivist.

4-18- Total properties of filters samples under research:-

After completion of all Tests required for all samples of filters under the research, quality assessment were used to evaluate the properties of the samples which means comparison the spaces of Radar Chart as evidenced by Figures from (31) to (42).

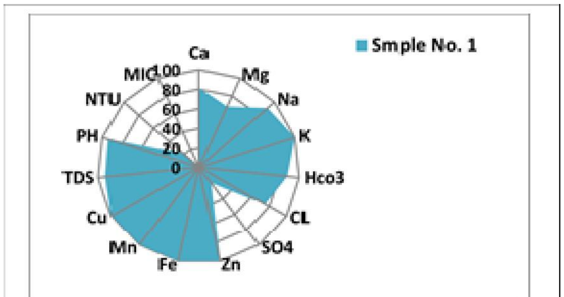

Figure (31): Properties of the sample (1)

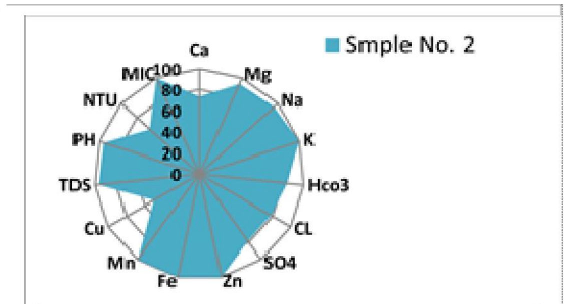

Figure (32): Properties of the sample (2)

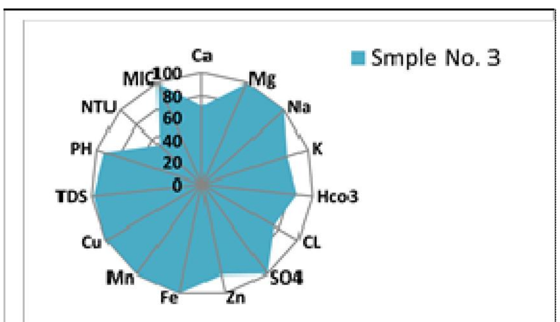

Figure (33): Properties of the sample (3)

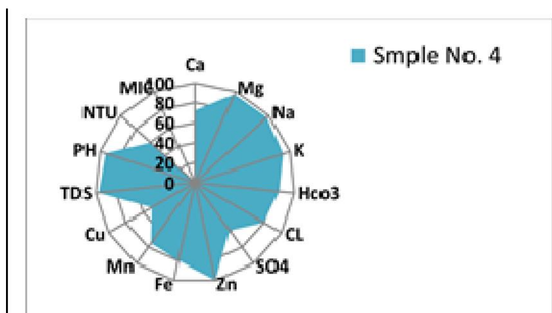

Figure (34): Properties of the sample (4)

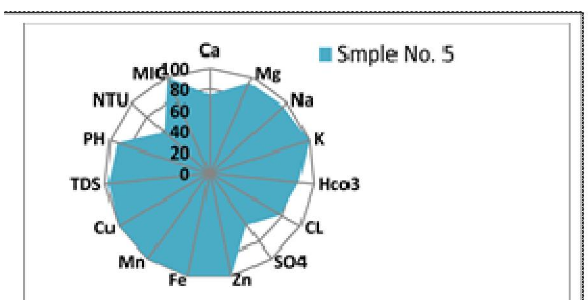

Figure (35): Properties of the sample (5)

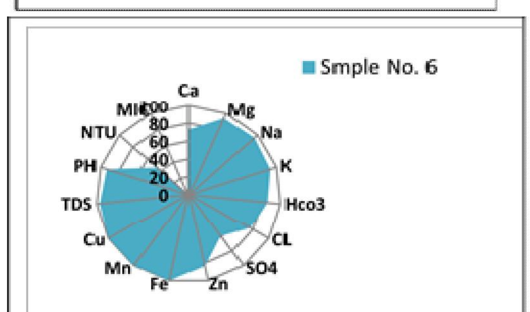

Figure (36): Properties of the sample (6)

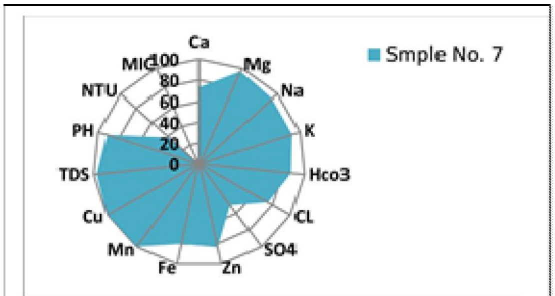

Figure (37): Properties of the sample (7)

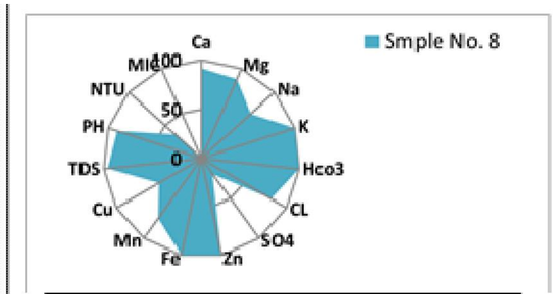

Figure (38): Properties of the sample (8)

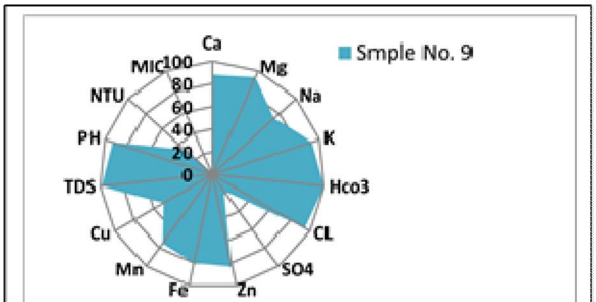

Figure (39): Properties of the sample (9)

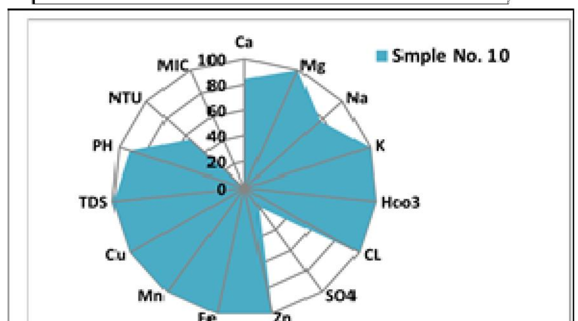

Figure (40): Properties of the sample (10)

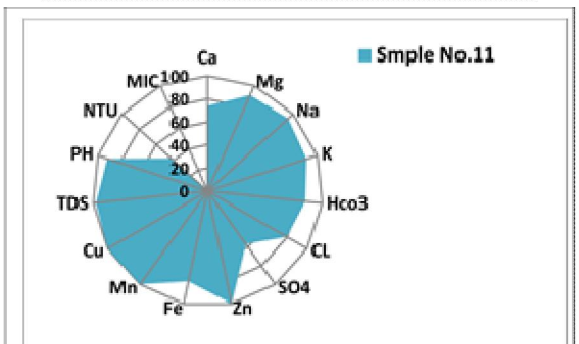

Figure (41): Properties of the sample (11)

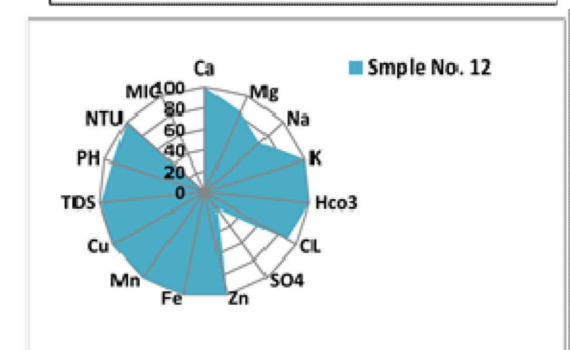

Figure (42): Properties of the sample (12)

Calculated the total area of the Radar Chart as separately for each sample shown in Table (25). Where this table shows the order of samples under the research in descending order.

Table (25): The descending order of filters samples under the research:-

Sample NO.	Total area of the Radar Chart
3	1340.862
5	1336.897
2	1308.717
12	1253.356
10	1226.081
6	1195.048
11	1184.004
7	1158.938
4	1139.25
1	1131.962
8	1096.619
9	1073.859

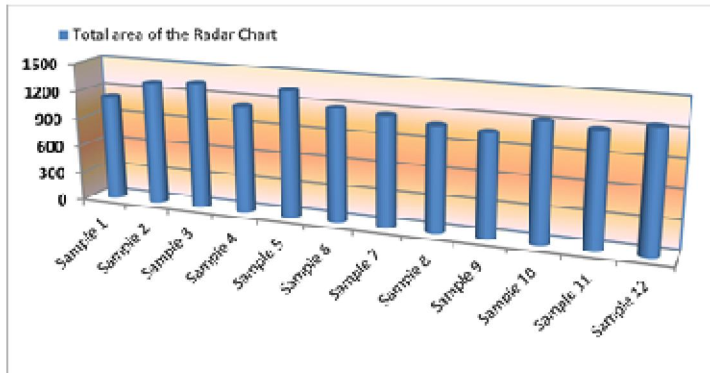

Figure (43): Properties of samples under study

- Through Table (25) and Figure (43) it is clear that the filter No. 3 achieved the best result in the purification of drinking water which from a local market filters, followed by filter No. 5 which produced under the research and the two filters also have achieved acceptable result in the test of Microbiology analysis (Fecal Coliform).

5-Conclusion:-

With the increased rate of drinking water pollution due to the higher rate of wastes of different industries and awareness for development of systems aiming at improving water quality to be used for purpose of drinking. Hence the modern industries have tended to Manufacture water filters, including (textile filters) in order to purify the drinking water of various and multi-pollutants existing in it. Therefore, the idea of this research which deals drinking water standards and the executive specifications of samples filters used in the local market and the samples produced under this research. And through theoretical and analytical studies, practical and applied experiments, laboratory tests and statistical analysis of the results done through sections of this research, we reached that there is significant effect of structural organization of the filter on all properties for the purification of drinking water, and all in the allowable limits as stated in the specification (190 to 2007) for safe drinking water. It has been found that:

- Filters numbers 2,3,5 succeeded in removing all the bacteria in the water by 100%, while other filters did not achieve a positive result acceptable.

-Filter No. 3 achieved the best result in the purification of drinking water which from a local market filters, followed by filter No. 5 which produced under the research.

6-References:-

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7/24/2014