The Effect of Material's Kind Variation on the Functional Performance Properties of the Woven curtains

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Abstract: Curtains' Fabric are considered one of the important types of furnishings either it was used inside homes, or hotels or restaurants or offices or meeting halls, and whatever purpose of use differed, at the end it is used for Two main purposes: First is Beneficial, as the glass windows and wall holes to allow man practices his personal life freely enough, or with the purpose of sound absorption and thermal insulation and protection of furniture from the harmful effect of sun rays especially in modern buildings of big glass faces. The second is Aesthetic represented in addition of art touch as an aesthetic value.

As the material type has effective effect on different Properties for these Fabrics, as the fibers play an important role either it was natural or Synthetic, and both has its advantages and characters that suits the final use.

So the research interested in study of The effect of difference material type on the functional performance Properties for woven curtains' Fabrics, by producing 25 woven samples, this Fabrics of five different materials that are: cotton, wool, polyester, poly acrylic, poly propylene, and Blending them. Then performing some laboratory tests on these Fabrics, these tests are: drapability, air permeability, thickness, stiffness, thermal insulation , light reflection and also ability to permeate ultraviolet rays in addition to sound absorption. Then tabulation of tests' results, then their analysis statistically, their discussion and drawing chart relationships.

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Abbreviation: Curtains: kind of fabrics used for covering windows and wall holes , **Sound Insulation**: The ability to absorp sound **Thermal Insulation:** The ability to reduce heat lost, **ends**:Vertical yarns, **Picks**:Horizontal yarns

1. Introduction

When production of curtains' fabrics, their functional performance should be put in consideration, then there is consistent relationship with many factors like their exposure to different atmospheres, and method of manufacture and degrees of maintenance. Also balance between aesthetic values, personal requirements and functional considerations should be considered [(1)].

The efficacy of functional performance of curtains' fabrics requires availability of some properties that help achieving the optimum performance, of these properties:

Light Control

The fabrics vary aiming to suit its function it performs, and this is by using the different textile fibers either it was natural or synthetic or blend aiming to improve some of its properties.

Drapability

Drapability property is considered one of the most important factors which affect on curtains' fabrics because it affects their appearance during use[(2).]

Drapability character is affected by many factors inter in its construction such as type of textile fiber, structure of yarn, number of ends and picks per square meter , weave structure, degree of stiffness or fabric flexibility, in addition to weight per square meter of the fabric[(1)] .

Crease Resistance

Crease resistance is considered of the properties that should be available in curtains' fabrics, as they are exposed to processes of pulling, pushing and flexion during use, also they exposed of process of washing, cleaning, high stresses, flexion and squeezing.

Crease resistance of fabrics depends greatly on construction of these fabrics, especially weave structure and type of textile fiber[(1)] .

Dimensional Stability

Dimensional stability and keeping the shape is a main requirement for any fabric hanged freely under its weight effect [(2)].

Color Stability to Light

Although the thermal energy of all visible spectral radiations and non visible has harmful effect on textile dyes, however, it was proved that the ultraviolet ray waves has a destructive effect clearly, because the natural light contains great amount of these short waves more than the present in artificial lights.

Also it's unhealthy for human body to obtain more doses on these rays, as they cause dermal cancer. So putting curtains on these windows lowers of harmful effect of these rays[(3)].

It was proven that whitened cotton yarns allows complete permeation of the rays, while its permeation decreases in raw yarns as the dyes, natural waxes absorb these rays, while poly amide fibers permeates the rays, while polyester fibers allow permeation of 10% of these rays, while micro-fiber allows permeation of only 5% of these rays [4, 5].

The higher density of yarns in fabrics the larger protection percent, with consideration that the weave structure is the first effect that limits the permeation of these rays[6].

Nano molecules from titanium and zinc oxides can be used to finish the textile products to protect against ultraviolet rays[7].

Dirt Resistance

Dirt resistance is considered the most important properties that should be available in curtains' fabrics, especially in places where high percentage of pollution is available, as in big cities and industrial cities[2].

Nano molecules from titanium di-oxide work as light factor to break the organic dirties and microorganisms on cotton fabrics' surface[7].

Parasites & Insects Resistance

Resistance of curtains to parasites and insects is considered the most important properties that should be available in curtains' fabrics, especially that are used in hot and semi-tropical regions, both heat and moisture help generation of suitable weather for growth of these parasites.

Chemicals that contain silicon or florescence can be used in processes final finishing that can make the cloths acquire high resistance against the parasites & insects[1].

Fire & Burning Resistance

Curtains' fabric should be characterized by fire & burning resistance, especially in public foundations and hotels.

Fabrics' resistance to burning depends upon type of textile fiber and weave structure of woven fabrics[2].

Color Stability during Wash & Dry Cleaning

The curtains' fabrics either it was stained or printed should be characterized by stability during washing and dry cleaning, that helps keeping the beauty of the curtain and its general appearance, also it helps increasing its durability and consumptive period[1].

Thermal Insulation

Putting a layer of fabrics on the window prevents heat leakage from inside to outside during cold weather and from outside to inside during hot weather, that affects directly on the amount of consumed energy in warming sets or air conditioners.

Using heavy curtains, these limits to a great extent from transfer or losing amount of heat.

The air is to be considered as bad connective to the temperature; therefore, it is considered the best natural separator to the thermal [8]. Also the thickness of fabric is considered the most important effective factors on the fabrics' ability to thermal insulation [9].

Sound Absorption

Resulted sound echo from elevated sound can be overcome using treated curtains by layer of sponge that contains enlarged yarns separated from each other by air gabs.

The Study [10] proves that, porous materials are more positive in absorbing sound wave, and furnishings' ability to absorb sound is associated with presence of air gabs.

2. The Experimental Work:

Five kinds of textile materials were used in this research which are: cotton, wool, polyester, polyacrylic, and polypropylene.

Table (1): The specifications of machine used for produced all samples

No.	Property	Specification
1	Kind of loom	Dobby
2	Speed of machine	180 picks per minute
3	Number of loom healds	16 healds
4	Kind of shading	Upper - Negative shade
5	Take up motion	Positive
6	Let off motion	Negative

Table (2): The specifications of warps used for produced all samples

No.	Property	Specification
1	Kind of ends and wefts	Cotton, wool, polyester, polyacrylic, and polypropylene
2	Count of ends and wefts	16.4 × 2 Tex
3	Number of ends/cm (end set)	20 ends/cm
4	Number of picks/cm (weft set)	18 picks/cm
5	Reed used (dents/cm)	10 dents/cm
6	Reeding (sleying)	2 ends/dent
7	Weave structure	Plain weave Structure 1/1
8	Number of healds used	4 healds + 2 for selvges

Table (3):The specifications of yarns used for produced all samples

Kind of material / Yarn specifications	Cotton	Wool	Polyester	Polyacrylic	Polypropylene
The actual count (Tex)	16.6 × 2	23.8 × 2	17.3 × 2	25.7 × 2	28.6 × 2
Twists per meter	702	634	450	332	428
Tensile strength (gm)	703.2	748	1106	739	830
Elongation (%)	7.72	19.1	19.7	20.02	19.15
C. V. (%)	25.14	10.64	1.8	8.86	7.70
Thick places/1000 m	426	2	0	1	1
Thin places/1000 m	237	122	0	63	15
Neps/1000 m	339	124	0	18	3

Tests and analysis:

In this part several tests were carried out in order to evaluate the produced fabrics, these tests were:

The drape of fabrics were determined according to (B. S. 5058 – 1973)[11].

The air permeability of fabrics was determined according to the (A. S. T. M- D737,75)[12].

The fabric thickness was determined according to the (A. S. T. M. – D3776)[13].

The fabric stiffness of fabrics was determined according to the (B.S. – 3356)[14].

The fabric weight was determined according to the (A. S. T. M. – D3787)[15].

The fabric factor of heat losted of fabrics.

The light reflection of fabrics.

The penetration of U. V. R. through fabrics.

The sound absorption through fabrics[16,17].

3. Results and Discussion:

Results of experimental tests on the produced samples are presented in the following tables (4- 7) and graphs. Results were statically analyzed for data listed.

Table (4): Some properties of all samples produced

Fabric properties / Material's kind		Fabrics drape factor	Air permeability ($cm^3/cm^2/s$)	Fabric thickness (mm)	Fabrics' stiffness (milligram)		Factor of heat losted	Weight (gm/m^2)
Warp	weft				Warp	weft		
Cotton	Cotton	0.6878	115.26	0.514	57.816	64.933	23.40	139.0
	Wool	0.7654	68.51	0.746	47.723	85.378	17.60	197.3
	Polyester	0.6497	101.06	0.534	46.635	64.440	19.70	143.2
	Polyacrylic	0.7768	90.22	0.688	50.924	106.589	18.70	175.6
	Polypropylene	0.8419	72.64	0.696	67.063	110.710	18.00	195.6
Wool	Cotton	0.8039	112.62	0.708	99.440	84.298	22.20	180.8
	Wool	0.8163	93.38	0.866	120.310	107.944	20.00	209.6
	Polyester	0.7684	71.72	0.662	99.499	96.535	17.60	179.6
	Polyacrylic	0.7967	90.57	0.860	131.861	141.336	19.10	211.4
	Polypropylene	0.7143	67.54	0.978	125.840	110.968	16.50	228.8
Polyester	Cotton	0.7401	124.80	0.536	73.808	50.688	24.50	158.4
	Wool	0.7259	110.00	0.670	72.960	91.960	20.90	190.0
	Polyester	0.7973	87.38	0.522	61.438	64.933	22.00	158.4
	Polyacrylic	0.7715	106.92	0.724	69.033	102.567	19.20	191.0
	Polypropylene	0.7465	76.55	0.784	75.214	112.406	18.60	207.2
Polyacrylic	Cotton	0.8800	46.46	0.972	119.584	79.802	17.20	136.8
	Wool	0.9021	72.12	0.688	114.873	85.984	22.50	182.0
	Polyester	0.7097	51.20	0.672	103.745	93.802	21.50	179.8
	Polyacrylic	0.8560	49.22	0.879	130.784	99.696	18.70	214.4
	Polypropylene	0.7988	41.37	1.012	114.660	136.416	16.80	235.2
Polypropylene	Cotton	0.8317	54.83	0.820	114.289	68.682	20.20	203.0
	Wool	0.7580	56.11	1.040	137.184	147.477	20.60	230.6
	Polyester	0.7157	33.16	0.804	136.475	122.982	18.40	206.0
	Polyacrylic	0,8199	45.86	1.060	132.520	129.344	19.80	231.8
	Polypropylene	0.8798	34.33	0.877	141.868	157.482	19.00	269.2

Table (5):The reflection of light for all samples produced

Material's kind / Wave length (nm)		400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700
Warp	weft																
Cotton	Cotton	30.03	28.87	28.43	28.48	30.73	32.49	33.16	32.83	32.31	30.27	29.39	29.85	28.99	33.20	44.70	52.49
	Wool	29.82	32.84	35.71	39.42	42.94	44.65	47.19	49.53	52.28	54.16	55.20	57.29	58.73	59.14	60.97	60.62
	Polyester	41.13	44.62	46.05	48.40	50.36	52.34	53.90	55.38	56.82	57.93	58.84	59.51	60.53	60.89	61.35	61.75
	Polyacrylic	27.85	30.19	29.28	28.68	27.58	25.70	23.70	22.38	21.61	21.09	21.08	21.05	21.42	23.44	34.99	47.36
	Polypropylene	31.46	32.01	31.73	32.09	33.17	34.57	34.85	33.96	32.75	31.58	30.63	31.07	31.39	33.30	45.91	55.02
Wool	Cotton	28.99	30.45	31.05	32.87	35.24	37.32	38.62	39.30	39.66	38.84	38.66	39.35	39.16	42.46	50.45	55.31
	Wool	31.28	34.67	37.92	41.23	44.06	46.89	49.49	51.97	54.42	56.28	57.94	59.28	60.47	61.29	62.14	62.72
	Polyester	39.28	39.86	39.78	40.10	41.69	43.09	43.53	43.28	42.92	41.40	40.62	40.98	40.35	43.53	51.62	56.42
	Polyacrylic	25.88	26.62	23.93	22.05	20.82	18.83	16.50	14.71	13.45	12.21	11.77	11.71	11.49	14.47	26.69	40.85
	Polypropylene	29.05	28.09	26.41	25.77	26.80	27.89	27.78	26.37	24.69	22.67	21.40	21.66	21.61	24.67	38.77	49.62
Polyester	Cotton	45.40	48.03	50.30	52.32	53.83	55.45	56.73	57.96	59.19	60.04	60.76	61.26	61.93	62.01	62.48	62.73
	Wool	43.23	43.92	44.08	44.43	45.80	47.07	47.37	47.09	46.66	45.30	44.69	44.85	44.42	46.98	54.07	58.36
	Polyester	59.99	61.43	62.29	63.35	63.34	63.78	63.83	63.77	63.89	63.85	63.78	63.68	63.66	63.47	63.84	63.84
	Polyacrylic	41.06	42.44	39.01	36.49	33.69	30.29	27.05	24.78	23.43	22.37	21.98	21.59	21.51	23.53	34.58	47.76
	Polypropylene	46.04	44.92	42.67	41.44	41.27	41.65	40.87	39.41	36.93	35.05	33.62	33.62	33.63	35.34	47.99	57.04
Polyacrylic	Cotton	26.89	29.29	26.84	25.22	23.25	20.38	17.62	15.81	14.71	14.02	13.86	13.76	13.96	16.36	29.16	44.86
	Wool	22.13	23.71	20.83	19.74	17.22	15.19	13.57	11.98	10.45	9.84	8.64	8.60	8.37	11.93	23.18	37.41
	Polyester	35.68	37.02	33.48	30.74	27.86	24.28	20.92	18.61	17.11	16.16	15.85	15.50	15.72	17.92	29.82	44.69
	Polyacrylic	24.11	25.64	20.75	17.33	13.96	9.89	6.35	4.13	2.90	2.11	1.87	1.76	1.84	4.29	16.63	34.95
	Polypropylene	27.04	26.83	22.85	20.25	18.28	15.94	13.33	11.02	9.25	7.99	7.24	7.24	7.45	10.30	24.09	40.01
Polypropylene	Cotton	31.58	31.49	30.64	30.68	31.63	32.95	33.10	31.98	30.45	29.04	27.95	28.40	28.69	31.06	45.43	56.05
	Wool	30.01	28.71	26.57	25.70	26.47	27.43	27.12	25.42	23.44	21.36	19.97	20.21	20.22	23.46	38.33	50.06
	Polyester	41.14	40.84	38.46	37.39	37.39	37.97	37.30	35.34	33.25	31.34	29.91	30.01	30.15	32.44	46.38	56.54
	Polyacrylic	27.68	26.97	23.18	20.94	19.50	17.80	15.00	13.27	11.21	9.94	9.59	9.08	9.31	12.34	26.36	41.67
	Polypropylene	28.72	27.76	24.68	23.20	23.30	23.89	23.19	20.93	18.58	16.55	15.01	15.19	15.32	18.65	34.34	48.55

Table (6): The penetration of U. V. R. through all samples produced

Material's kind / Wave length (nm)		190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360	370	380
Warp	weft																				
Cotton	Cotton	2.209	2.235	2.249	2.264	2.281	2.299	2.309	2.314	2.313	2.310	2.308	2.308	2.308	2.308	2.333	2.336	2.337	2.341	2.344	2.364
	Wool	1.308	1.272	1.270	1.267	1.267	1.267	1.267	1.267	1.265	1.266	1.266	1.266	1.270	1.334	1.378	1.381	1.383	1.397	1.417	1.427
	Polyester	1.020	1.047	1.060	1.071	1.082	1.095	1.105	1.117	1.129	1.136	1.139	1.141	1.115	1.175	1.136	1.130	1.128	1.130	1.138	1.150
	Polyacrylic	0.968	0.969	0.969	0.975	0.999	1.013	1.015	1.015	1.015	1.021	1.026	1.029	1.031	1.035	0.988	0.987	0.992	1.000	1.002	1.013
	Polypropylene	0.844	0.828	0.831	0.836	0.843	0.849	0.856	0.860	0.865	0.870	0.875	0.880	0.885	0.891	0.924	0.930	0.928	0.923	0.920	0.908
Wool	Cotton	1.148	1.287	1.318	1.344	1.360	1.390	1.412	1.423	1.432	1.433	1.434	1.447	1.462	1.486	1.389	1.388	1.388	1.407	1.432	1.505
	Wool	0.829	0.801	0.801	0.801	0.801	0.801	0.801	0.801	0.802	0.814	0.817	0.818	0.818	0.834	0.834	0.921	0.922	0.934	0.948	0.969
	Polyester	0.633	0.678	0.687	0.690	0.702	0.712	0.720	0.728	0.734	0.738	0.743	0.751	0.765	0.820	0.857	0.869	0.871	0.890	0.924	0.975
	Polyacrylic	0.538	0.604	0.621	0.633	0.643	0.660	0.662	0.670	0.680	0.681	0.681	0.684	0.696	0.699	0.705	0.709	0.714	0.724	0.739	0.775
	Polypropylene	0.293	0.299	0.303	0.307	0.314	0.319	0.322	0.323	0.324	0.327	0.329	0.332	0.338	0.354	0.355	0.363	0.365	0.371	0.383	0.397
Polyester	Cotton	1.830	1.826	1.824	1.821	1.821	1.817	1.815	1.813	1.806	1.802	1.797	1.794	1.794	1.814	1.840	1.842	1.844	1.847	1.853	1.864
	Wool	1.539	1.504	1.499	1.498	1.497	1.492	1.489	1.487	1.486	1.486	1.485	1.486	1.495	1.552	1.600	1.609	1.609	1.621	1.639	1.645
	Polyester	0.828	0.775	0.779	0.779	0.778	0.774	0.774	0.776	0.784	0.784	0.777	0.775	0.790	0.837	0.835	0.834	0.833	0.839	0.854	0.887
	Polyacrylic	0.363	0.398	0.409	0.422	0.439	0.453	0.464	0.472	0.480	0.489	0.497	0.505	0.517	0.547	0.600	0.614	0.620	0.636	0.636	0.694
	Polypropylene	0.183	0.178	0.176	0.174	0.174	0.174	0.174	0.173	0.173	0.173	0.171	0.172	0.174	0.176	0.199	0.200	0.203	0.217	0.253	0.294
Polyacrylic	Cotton	0.642	0.647	0.649	0.649	0.650	0.654	0.656	0.662	0.673	0.681	0.682	0.683	0.700	0.732	0.786	0.794	0.792	0.789	0.788	0.770
	Wool	0.485	0.483	0.482	0.479	0.479	0.472	0.472	0.476	0.483	0.485	0.485	0.486	0.498	0.451	0.576	0.585	0.586	0.587	0.598	0.614
	Polyester	0.220	0.224	0.225	0.225	0.226	0.229	0.229	0.233	0.233	0.236	0.236	0.238	0.244	0.266	0.269	0.271	0.275	0.275	0.276	0.279
	Polyacrylic	0.238	0.230	0.227	0.224	0.223	0.219	0.218	0.218	0.220	0.222	0.222	0.223	0.223	0.235	0.236	0.237	0.234	0.234	0.234	0.241
	Polypropylene	0.199	0.178	0.173	0.171	0.170	0.168	0.165	0.164	0.164	0.163	0.162	0.159	0.158	0.164	0.171	0.172	0.173	0.175	0.175	0.177
Polypropylene	Cotton	0.308	0.283	0.227	0.277	0.286	0.287	0.288	0.288	0.289	0.294	0.300	0.303	0.309	0.324	0.347	0.355	0.361	0.366	0.371	0.375
	Wool	0.166	0.154	0.150	0.149	0.154	0.157	0.157	0.157	0.158	0.163	0.167	0.173	0.177	0.184	0.195	0.204	0.206	0.214	0.215	0.226
	Polyester	0.114	0.118	0.119	0.122	0.130	0.130	0.139	0.140	0.144	0.150	0.154	0.159	0.165	0.180	0.196	0.200	0.200	0.203	0.208	0.216
	Polyacrylic	0.048	0.088	0.088	0.089	0.095	0.098	0.099	0.100	0.101	0.105	0.109	0.122	0.115	0.121	0.133	0.139	0.143	0.146	0.149	0.152
	Polypropylene	0.006	0.006	0.006	0.006	0.007	0.007	0.008	0.008	0.008	0.009	0.010	0.011	0.014	0.017	0.029	0.029	0.030	0.033	0.040	0.054

Table (7): The sound absorption through fabrics produced from polyacrylic yarns as a warp.

Frequency (hz) / Kind of wefts' material	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000
Cotton	0.14	0.13	0.12	0.09	0.07	0.05	0.04	0.03	0.05	0.06	0.03	0.04	0.10	0.12	0.18	0.19	0.33	0.35	0.39	0.42
Wool	0.16	0.15	0.14	0.12	0.09	0.08	0.06	0.05	0.07	0.08	0.05	0.06	0.12	0.15	0.23	0.25	0.36	0.43	0.47	0.55
Polyester	0.15	0.14	0.13	0.11	0.08	0.07	0.05	0.04	0.06	0.07	0.04	0.05	0.11	0.13	0.23	0.23	0.35	0.38	0.42	0.47
Polyacrylic	0.21	0.19	0.17	0.16	0.15	0.14	0.10	0.09	0.11	0.13	0.14	0.15	0.21	0.25	0.33	0.37	0.42	0.45	0.51	0.64
Polypropylene	0.18	0.17	0.15	0.13	0.11	0.09	0.07	0.06	0.08	0.09	0.08	0.10	0.14	0.19	0.25	0.27	0.38	0.44	0.49	0.62

Fabrics' drape factor

It was shown from table (4) that, fabrics produced from cotton yarns gave the best results concerning the property of drape factor, followed by fabrics produced from polyester yarns, after that fabrics produced from wool yarns, followed by fabrics produced from polyacrylic yarns, and lastly fabrics produced from polypropylene yarns which recorded the worst results (all other executional specifications are constant).

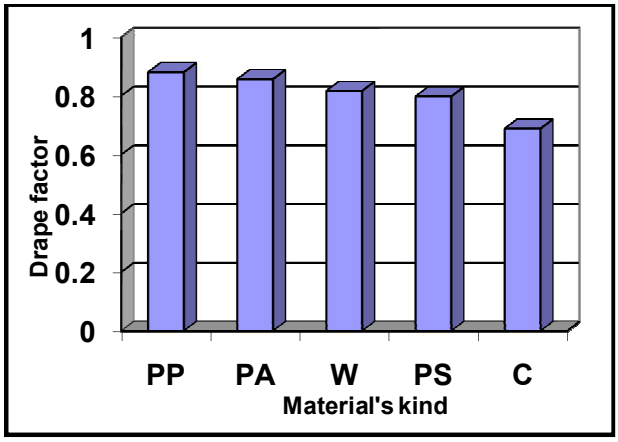

Fig (1). The effect of material's kind variation on fabrics' drape factor

Air permeability

Figure (2) shows that, fabrics produced from cotton yarns have verified the highest readings for air permeability property, followed by fabrics produced from wool yarns, after that fabrics produced from polyester yarns, followed by fabrics produced from polyacrylic yarns, and lastly fabrics produced from polypropylene yarns which recorded the least readings (all other executional specifications are constant). These concerning with the thickness of fabrics.

Fabrics' thickness

From the results of fabrics' properties tests which are written down in table (4). It becomes that, fabrics produced from polyacrylic yarns have recorded the highest results for thickness property, followed by fabrics produced from polypropylene yarns, after that fabrics produced from wool yarns, followed by fabrics produced from polyester yarns, and lastly fabrics produced from cotton yarns which recorded the least readings (all other executional specifications are constant). This due to the bulked yarns of polyacrylic material, in addition to it has lower specific density if it is compared with fabrics produced from other kind of materials. Where the specific density for wool is 1.3, cotton 1.54, polyester 1.23, polypropylene 0.9 and polyacrylic 1.16.

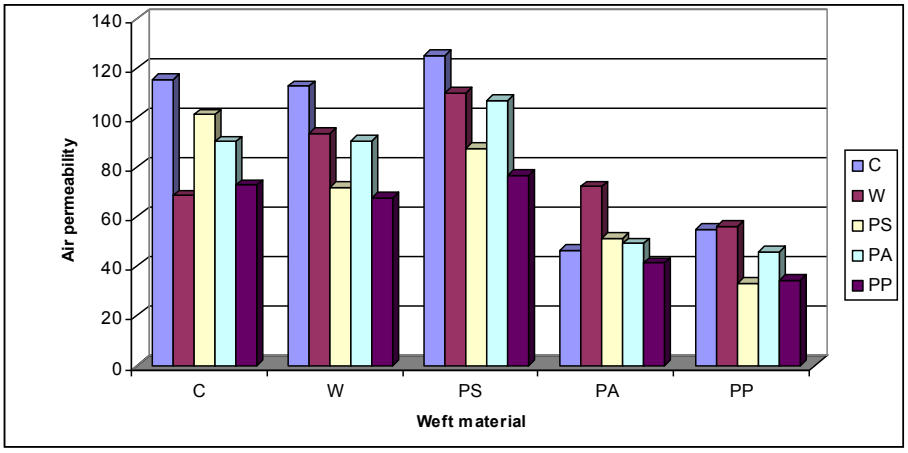

Fig (2). The effect of material's kind variation on fabrics' air permeability.

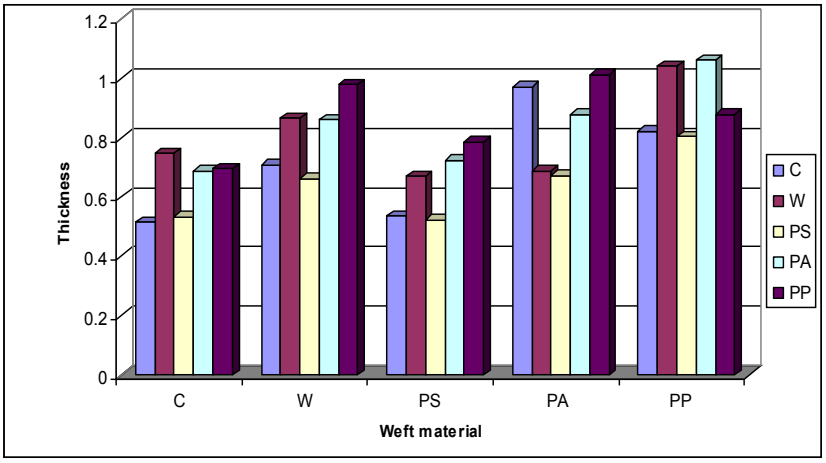

Fig (3): The effect of material's kind variation on fabrics' thickness.

Fabrics' stiffness

Figures (4 and 5) showed that, fabrics produced from polypropylene yarns have verified the highest readings for stiffness on the warp and weft direction, followed by fabrics produced from polyacrylic yarns, after that fabrics produced from wool yarns, followed by fabrics produced from polyester yarns, and lastly fabrics produced from cotton yarns which recorded the least readings (all other executional specifications are constant).

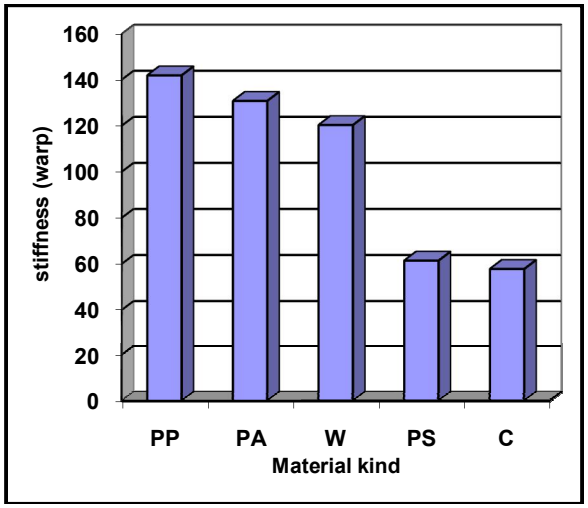

Fig (4)The effect of material's kind variation on fabrics' stiffness on warp direction.

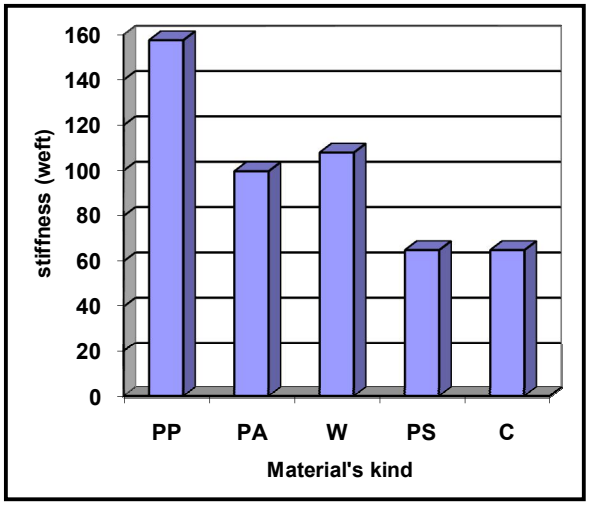

Fig (5)The effect of material's kind variation on fabrics' stiffness on weft direction.

Factor of heat lost

The specific tables of test results showed that, fabrics produced from polyacrylic yarns gave the best results concerning the property of thermal insulation, followed by fabrics produced from polypropylene yarns, after that fabrics produced from wool yarns, followed by fabrics produced from polyester yarns, and lastly fabrics produced from cotton yarns which recorded the worst results (all other executional specifications are constant).

This due to the bulked yarns of polyacrylic material it addition to its lower specific density which leads to preserve the warm air existing between fibers, causing decrease the quantity of lost heat causing an increase the ability of produced fabrics to insulate heat.

Light reflection of fabrics

Table (5) and figure (7) showed hat, fabrics produced from polyester yarns has verified highest reading for light reflection property at all wave lengths measured, followed by fabrics produced from wool yarns, after that fabrics produced from cotton yarns, followed by fabrics produced from polypropylene yarns, and lastly fabrics produced from polyacrylic yarns which recorded the least readings (all other executional specifications are constant).

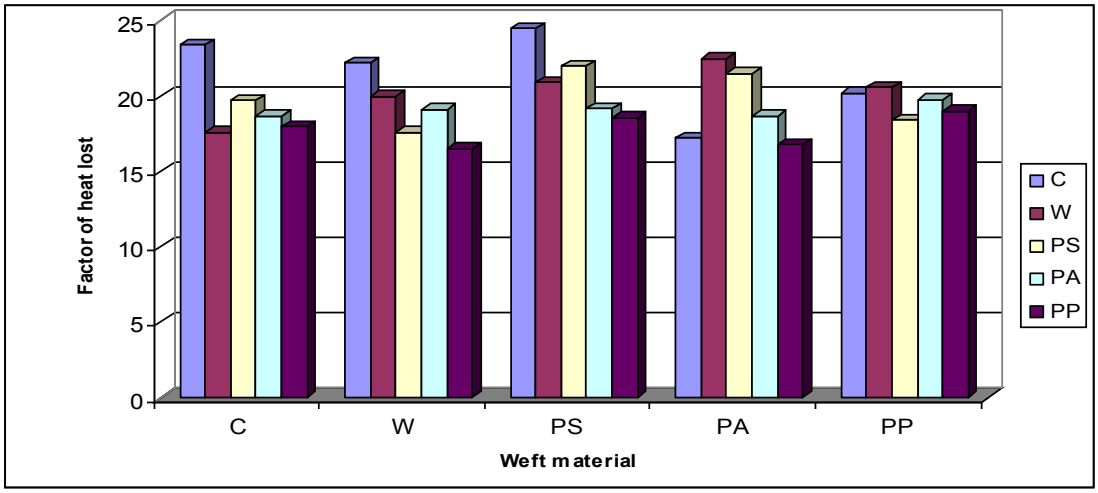

Fig (6). The effect of material kind variation on the factor of heat lost.

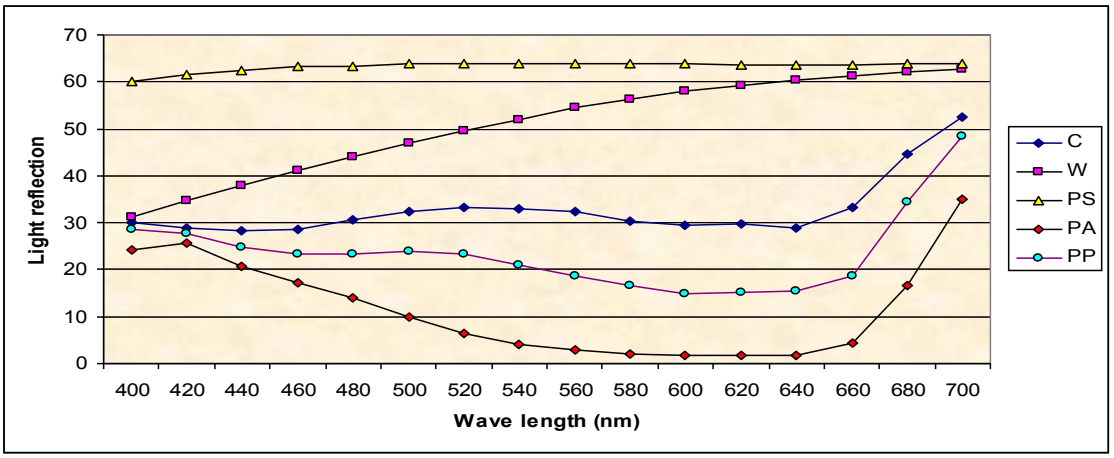

Fig (7). The effect of material's kind variation on the light reflection of fabrics (at all wave lengths measured).

The penetration of U.V.R.

Table (6) showed hat, fabrics produced from cotton yarns have verified the highest readings for the penetration of U.V.R. property, followed by fabrics produced from wool yarns, after that fabrics produced from polyester yarns, followed by fabrics produced from polyacrylic yarns, and lastly fabrics produced from polypropylene yarns which recorded the least readings (all other executional specifications are constant). These concerning with air permeability of produced fabrics.

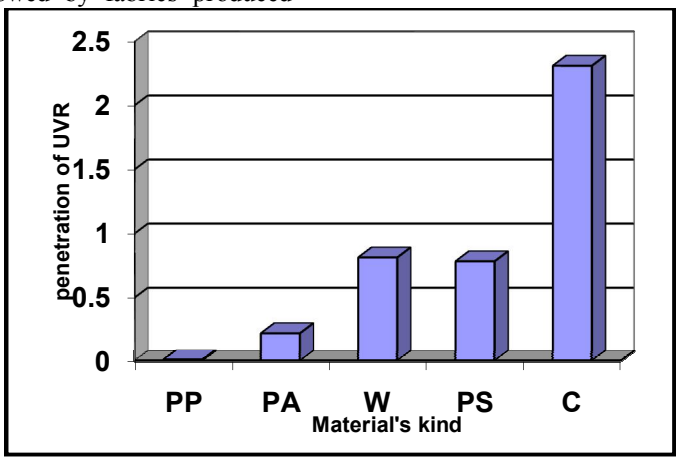

Fig (8). The effect of material's kind variation on the penetration of U.V.R. at wave length (280nm)

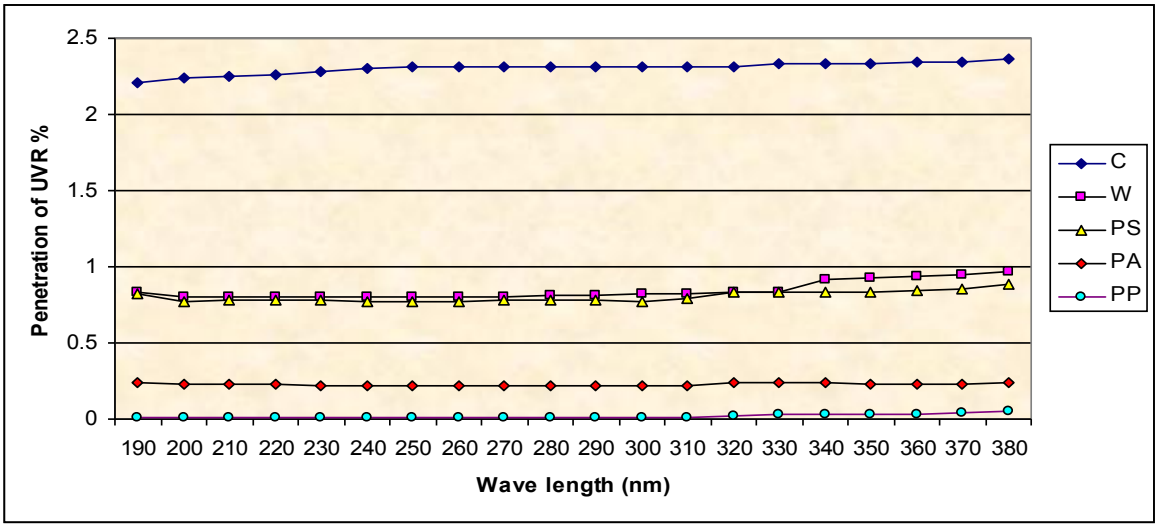

Fig (9). The effect of material kind variation on the penetration of U.V.R. (at all wavelengths).

Sound absorption:

Table (7) and figure (10) showed that, fabrics produced from 100% polyacrylic yarns have verified the highest readings for the property of sound absorption (at all frequencies measured), followed by fabrics blended from polyacrylic and polypropylene yarns, after that fabrics blended from polyacrylic and wool yarns, followed by fabrics blended from polyacrylic and polyacrylic and polyester yarns, and lastly fabrics blended from polyacrylic and cotton yarns which recorded the least readings (all other executional specifications are constant).

These due to reduction of the specific density of polyacrylic material which leads to preserving the air existing between fibers in addition to the highest readings of thickness for this material, that has an effective influence upon the property of sound absorption.

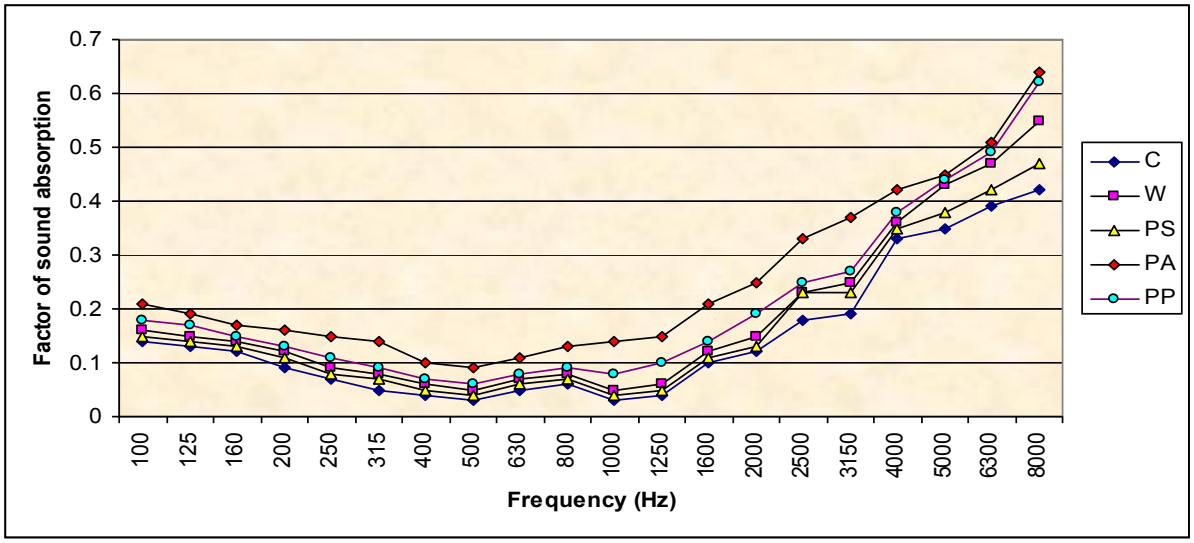

Fig (10). The effect of wefts' material kind variation on the sound absorption through fabrics produced from polyacrylic yarns as a warp (at all frequencies).

Conclusions:

The study proved that, fabrics blended from cotton yarns gave the best results of drape factor; whereas fabrics blended from polypropylene yarns recorded the worst results (all other executional specifications are constant).

Fabrics blended from cotton yarns have verified the highest readings for air permeability; whereas fabrics blended from polypropylene yarns recorded the least readings (all other executional specifications are constant).

The study assured that, fabrics blended from polyacrylic yarns have verified the highest readings for

thickness property; whereas fabrics blended from cotton yarns recorded the least readings (all other executional specifications are constant).

It is showed that, fabrics blended from cotton yarns gave the best results of stiffness on the warp and weft directions; whereas fabrics blended from polypropylene yarns recorded the worst results (all other executional specifications are constant).

The study showed that, fabrics blended from polyacrylic yarns recorded the best results of thermal insulation; whereas fabrics blended from cotton yarns recorded the worst results (all other executional specifications are constant).

Fabrics blended from polyester yarns recorded the highest readings for light reflection (at all wave lengths); whereas fabrics blended from polyacrylic yarns recorded the least readings (all other executional specifications are constant).

The study proved that, fabrics blended from cotton yarns has verified the highest readings for the penetration of U.V.R. property (at all wave lengths); whereas fabrics blended from polypropylene yarns recorded the least readings (all other executional specifications are constant).

The study assured that, fabrics blended from 100% polyacrylic yarns recorded the best results of sound absorption (at all frequencies) (all other executional specifications are constant).

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