Implementation of Poly propylene glycol (PPG) for decreasing allergic function and given UV protection on human body through Textile process as a block polymer

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Abstract :

Poly propylene glycol(PPG) usually used mostly in pharmaceuticals industry.In this paper I attempted to put into effect of Poly propylene glycol at textile process.PPG end uses in this article will show as UV light protection and allergic reaction protective. The high energy light rays of UV light are able to cause chemical changes within the DNA molecules, changing their chemical structure and breaking bonds.When this happens, it can lead to skin cancer,high amounts of UV exposure is a leading risk factor for the development of skin cancer.In this experiment i used one bath of process instead of two bath process which save energy and time. I used reactive and disperse dyes for the combination of cotton and polyester fibers.PPG will work like as catalyst to perform here and will make coating on fabric surface.This PPG polymeric coating will react the allergic body skin and tends to decrease the reaction of allergic function and UV protection of the body.In the final stage, the processed fabric was evaluated by testing the light, washing and rubbing fastness and colour yield strength properties.

Keywords : Polypropylene Glycol, UV light protection, Allergies, skin disease, Block Ploymer.

Introduction :

Worldwide, allergic rhinitis affects between 10% and 30 % of the population **11.** Allergies, also known as allergic diseases, are a number of conditions caused by hypersensitivity of the immune system to typically harmless substances in the environment. These diseases include hay fever, food allergies, atopic dermatitis, allergic asthma, and anaphylaxis. Ultraviolet (UV) light has shorter wavelengths than visible light. Although UV waves are invisible to the human eye, some insects,

such as bumblebees, can see them. This is similar to how a dog can hear the sound of a whistle just outside the hearing range of humans. The best known acute effect of excessive UV exposure is erythema, the familiar skin reddening termed sunburn. In addition, most people will tan from the UV stimulation of melanin production, which occurs within a few days following exposure. A further, less obvious adaptive effect is the thickening of the outermost layers of the skin that attenuates UV penetration to the deeper layers of the skin. Both changes are a sign of damage to the skin.Susceptibility to skin damage depends on skin type; individuals with fairer skin will be more prone to sunburn or erythema, than people with darker skin Similarly, the ability to adapt to UV exposure (able to tan) also depends on skin type **12**.

There are also different types of UV rays, based on how much energy they have. Higher-energy UV rays are a form of *ionizing radiation*. This means they have enough energy to remove an electron from (ionize) an atom or molecule. Ionizing radiation can damage the DNA (genes) in cells, which in turn may lead to cancer. But even the highest-energy UV rays don't have enough energy to penetrate deeply into the body, so their main effect is on the skin. Most skin cancers are a result of exposure to the UV rays in sunlight. Both basal cell and squamous cell cancers (the most common types of skin cancer) tend to be found on sun-exposed parts of the body, and their occurrence is typically related to lifetime sun exposure. The risk of melanoma, a more serious but less common type of skin cancer, is also related to sun exposure, although perhaps not as strongly. Skin cancer has also been linked to exposure to some man-made sources of UV rays[3].Implemented PPG in textile process will work like as catalyst in one bath dying process of reactive and disperse dyes molecules. commercial dye powder for patch testing and the same concentration in distilled water for prick testing seem to be suitable for the screening of-allergy reactive dyes.Reactive dyes causes allergic diseases.[1] Allergen immunotherapy is the practice of administering gradually increasing quantities of an allergen extract to an allergic subject to ameliorate the symptoms associated with subsequent exposure to the causative allergen. Allergen immunotherapy was introduced to treat "pollinosis.[2] Many allergens are soluble proteins that function in their natural state as enzymes, by, for example, inducing proteolysis. Allergenic properties may be related to the enzymatic activity (e.g., increased mucosal permeability) and to aerodynamic properties.[3] There are two types of skin aging: intrinsic aging and extrinsic aging (photo-aging). Intrinsic skin aging is related to natural biological aging processes in sun-protected skin. Intrinsically aged skin appears smooth, pale, and finely wrinkled in contrast to photo-aged skin, which is coarsely wrinkled and frequently characterized by abnormal pigmentation and telangiectasias. The greatest differences between intrinsically aged and photo-aged skin occur within the dermis and involve degradation of a number of extracellular matrix proteins, including collagen and elastic fibers. Photo-aging is the effect of long-term UV exposure and sun damage superimposed on intrinsically aged skin and affects light- vessels are thickened, and glycosaminoglycans and inflammatory er-skinned individuals more severely. The face, neck, and dor- cells increase. sum of hands and forearms are most commonly affected. Many UV radiation results in the generation of ROS or free radicals, skin functions that decline with age show an accelerated decline in leading to increased activation of cytokine and growth factor photo-aged skin. [4] During UV exposure of the skin, a clear increase in

ion intensity was observed for 7 masses. shows a typical example of a measurement from the headspace of UV-irradiated skin on the lower inside arm. The time behavior found with PTR-MS was identical to that of the ethene measurements. Due to the low gas flow through the skin cuvette the combined time constant of gas inlet system and drift tube was 1.5 min, The initial rise in concentration can be observed just before 1.7 min after the UV is switched on (t = 0). This indicates that lipid peroxidation begins within seconds after the start of the UV-irradiation. After about 3.3 min a stable ion count rate is reached.[5]With the combination of PPG through the reactive and disperse dyes molecules are coated with PPG polymer on fabric surface.This layer will protect the skin from UV light and react PPG polymer on the presence of moisture to reduce the function of allergy.
Figure-1 shows the mechanism

Fig:1 shows the mechanism

Materials and Method :

The demand for environmentally friendly dyes of high wet fastness on polyester is increasing. In addition, there are rising global legislative pressures to reduce the impact of dyeing processes on the environment through reductions in effluent discharge as well as in the use of energy and materials. Alkali-clearable disperse dyes offer a means of tackling both of these challenges simultaneously.[6]

Materials:

We use Ciba corn dyes as reactive dyes and Disperse Yellow 184 as disperse dyes.This Experiment was done at Esquire Knit Lab.The fabric composition is (70% cotton + 30% polyester).First Step dyeing is cotton dyeing and second step is polyester dyeing with dispersing agent in the presence of poly propylene glycol.In our experiment we found this poly propylene glycol help to hold the cotton and polyester dyestuff both alkali and acidic medium. Dispersing agent used as dispersion of disperse dyes and

caustic also used for alkali medium.The shed % of the fabric is 6.5%(Deep Shade) and the fabric GSM is 180(S/J).Figure-3 shows in details with graph:

Analysis of parameters :

Pretreatment process of fabric is similar as we are doing for PC fabric. Scoured and bleached fabric is treated in a sample dying machine. The number-average molecular weight of all samples of the cotton fibre, which had been subjected to different treatments, was determined using GPC with a Waters 2695 Separations Module, equipped with a Waters 2410 Refractive Index Detector. [7]

Fig 2: SEM view of reactive dyes molecules

Chemicals and auxiliaries used:

Table -1 and Table -2 is showing the required chemicals:

Table-1 Process of Reactive Dyes	
Chemicals	Quantity
Reactive dye=2.5%	2.5% (Dyeing time 60min)
Caustic soda(pH=11)	0.75%
Glauber salt	3%
Wetting agent	0.75%
Sequestering agent	0.75%
Levelling agent	0.50%

Soda ash	1%

Table-2 Process of Reactive Dyes	
Chemicals	Quantity
Disperse dyes	4% (Dyeing time 40 min.)
Dispersing agent(Arisil-Sandoz)	1.00%
Acetic Acid(pH=4.5-5)	1%

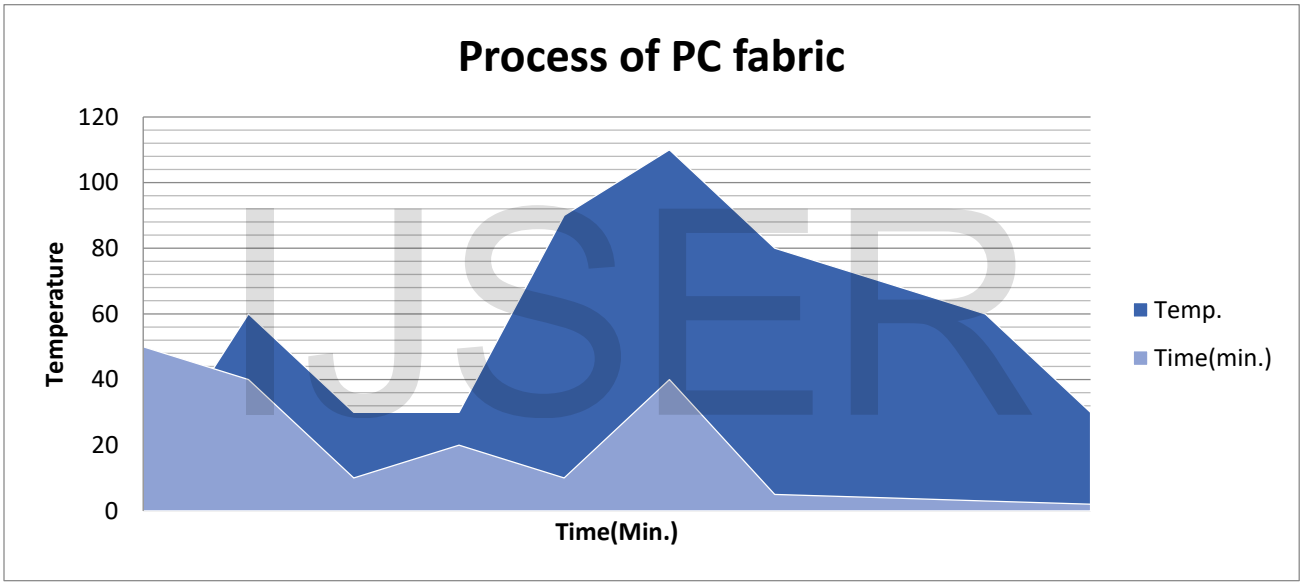

Fig 3: process of treated pc fabric with PPG.

Catalyst polymer for the protection of UV and allergic reaction:

Poly propylene glycol :

At first we do cotton part dying, fabric with same cotton dying liquor ratio for Lab we used.Enter the fabric in the machines, rise the temp. up to 60℃,then enter the chemical for reactive dyeing as mentioned before check the pH and then enter reactive dyes. After finishing the cotton part dyeing, we drain the bath upto 30% of solution. Now 30% new water given.Add poly propylene glycol in 40 degree.Rise the temp. and add acetic acid , check the pH and enter dispersing agent then disperse dyes.Rise the Temp. upto 110 ℃ due to use polypropylene glycol(its own high viscosity nature)**11** .As a

nature of poly propylene glycol ,we found that the reaction of disperse dyes can be done properly.Drain the Bath and given a normal wash.Polypropylene glycol spectrum of wavelength is shown in figure 4:

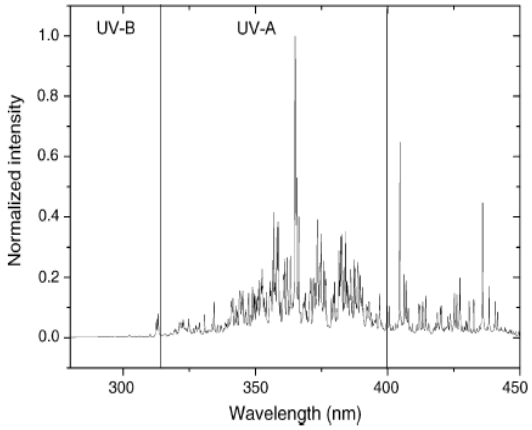

Fig 4: Spectrum of UV source

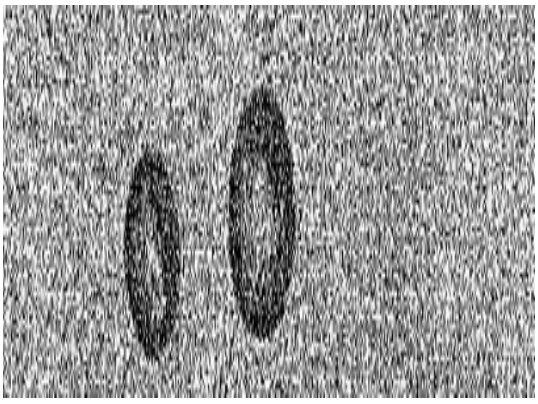

Fig 5: microscopic view of PPG.

Result and discussion:

We found a deep shade fabric after dyeing.The fabric will be little bit soft due to treat with polypropylene glycol(newly introduced).We found Rubbing Fastness (result is given below)

Condtion	Rates
Dry	3-4
Wet	2.25-2.5

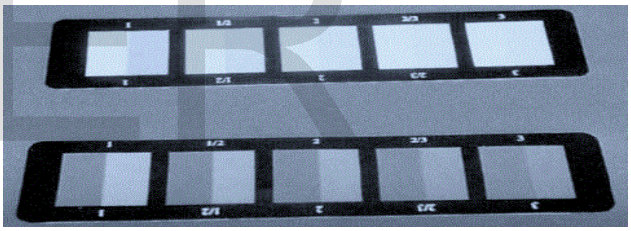

Fig 6 : Rubbing Fastness test

Dry skin is caused by a loss of water in the upper layer of the skin. Emollients/moisturizers work by forming an oily layer on the top of the skin that traps water in the skin.

Product	Cloud Point		Viscosity			Flash Point	Pour Point	Targeted Molecular Weight	Specific Gravity
Sun reflective mode	1% aqueous	10%	25°C	40°C	100°C	ºC	ºC	g/mol	25°C
Units	ºC	ºC							
P400E	>95	68	68	31	5	>150	-49	425	1.007
P600E	65	57	84	38	6	>200	-47	600	1.003
P750E	40	44	120	48	8	>100	-46	750	1.002

P100E	21	38	143	71	11	>150	-43	1000	1.004

Humectants, including glycerin, lecithin, and propylene glycol, draw water into the outer layer of skin. Many products also have ingredients that soften the horny substance (keratin) that holds the top layer of skin cells .For this particular condition of PPG ,we need to use this PPG(Polypropylene glycol)[12] .

Discussion:

Waterborne polyurethanes (WPUs) with high solid contents were synthesized by using poly propylene glycol (PPG) as the soft segment With the rapid development of the polyurethane industry, polyurethane has become one of the most useful polymeric materials in our daily lives. Due to the high volatile organic compounds (VOCs) evaporation of conventional solvent-based polyurethane, waterborne polyurethane (WPU) has attracted increasing attention due to its advantages of environmental friendliness, economic efficiency and low toxicity.[8] PPG working as a polymer coating to protect UV light reflection and decrease allergic functions from body.In this attempt , I tried to match PPG with the combination of reactive ,disperse molecules and PC blend fabric. A novel amphiphilic block polymer poly(ethylene glycol) which contains the nanoparticles properties such as particle size, drug loading, encapsulation efficiency (EE) and drug release behavior were investigated as a function of the hydrophobic block length of PPC segments and compared with each other. The results showed that the EE was up to 88.8%.Nanoparticles were found to have a certain effect on the controlled release of DOX [9]. Organogels with high and fast absorption properties, as well as reusability functions, were successfully prepared through the condensation reactions of different molecular weights of poly propylene glycol.[10]

Conclusion:

With the help of PPG(poly propylene glycol we can control our textile polluted environment as well as it will work like as a catalyst of this process.Beside that PPG is a block polymer which effects the fabric surface coating for the minimization of allergic reactions through body and UV light protection. The amphiphilic block polymer PEG-PPG-PEG could provide a new strategy for designing barriers of high efficiency.

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