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(54) **Title**: NOVEL SYNERGISTIC TRANSPARENT / TRANSLUCENT HYDROGEL COMPOSITION; METHOD OF PREPARING IT AND A SHEET / FILM MADE THEREFORM

(57) **Abstract**: The invention disclosed in this application relates to a novel synergistic transparent / translucent hydrogel composition capable of making it into hydrogel sheet / film useful for cosmetic and / or medical purposes having excellent skin adhesion, which comprises (i) any one of the gellable polysaccharide which do not form elastic gels and / or polymer & copolymer of acrylic acid / acrylate esters, and (ii) kappa carrageenan (a gellable polysaccharide) the pH of the above said compositions being in the range of 3 to 12. This invention also relates to a method of preparing the novel synergistic hydrogel composition, a translucent / transparent hydrogel sheet / film and a method of preparing the said sheet / film.

NOVEL SYNERGISTIC TRANSPARENT / TRANSLUCENT HYDROGEL COMPOSITION; METHOD OF PREPARING IT AND SHEET / FILM MADE THEREFROM

▫ Field of invention

This invention relates to novel synergistic transparent / translucent hydrogel composition method of preparing the composition and sheet / film made therefrom. The transparent / translucent hydrogel sheet / film made from the novel hydrogel composition are useful for cosmetic and / or medical purposes. The novel synergistic hydrogel composition and the transparent / translucent sheet / film made from such a hydrogel composition have excellent skin adhesivity (clingability) and ability to mould itself to the body contours without falling off from the skin. The novel transparent / translucent hydrogel sheet / films made from the synergistic hydrogel composition has good elasticity, excellent break strength (can be folded several times without breaking off) thereby making it easy to handle & has no tackiness. By the term 'hydrogel' we mean that it is a gel that contains water.

The present invention relates to a novel synergistic transparent / translucent hydrogel composition which is capable of forming sheet / film. The sheet or film made from the novel hydrogel composition can be applied directly on to the skin for a desired period of time and capable of containing functional component useful for cosmetic benefits or can contain a component with drug actives to deliver functional benefits.

The synergistic hydrogel composition of the present invention can be a binary or a ternary composition of gellable polysaccharides and / or polymers & copolymers of acrylic acid / acrylate esters, in specific ratios. By the term binary it is meant that the composition is a combination of either (a) 2 gellable polysaccharides or (b) a gellable polysaccharide and polymer & copolymer of acrylic acid / acrylate esters. By the term ternary composition it is meant that the composition is a combination of either (a) 3 gellable polysaccharides or (b) 2 gellable polysaccharides and polymer & copolymer of acrylic acid / acrylate esters. The composition is preferably a ternary composition

▫ Background of the invention

The term 'cosmetic' referred to in this specification includes but not limited to, use in relation to personal care and hygiene, for all external application to the body (including inside the mouth e.g. dentrifices), including in relation to cleaning, perfumery, essential oils, aromatherapy oils,

cosmetics, deodorants, deodorisers, antiperspirants, soothing & cooling skin care products including for eyelids application, suntan and after sun preparations, skin lightening, skin brightening, anti-aging, anti-acne / pimple, anti-pollution, skin firming, skin tightening, anti-cellulite preparations, toilet preparations and preparations for care of the body, skin, nail, hair & mouth. It is to be noted that the invention can be used for medicated preparations and may be used in 'non-cosmetic medical applications' because of its dermatologically acceptable properties e.g. its feel when applied to the skin. The invention may be used in intact skin as well as skin damaged due to cuts, bruises, burns, wounds and the like.

- **Prior art**

A number of cosmetic, medicated and food products are required in gel form. Most of the gel products are flowable in nature due to its viscoelasticity properties and this is made use of for applying and spreading products on the skin or suitable substrate. Food products make use of gelatin and other gums to get specific feel of the product like springiness, elasticity, firmness & gumminess.

Many of the gel products currently used for cosmetic & medicated purposes are mainly to apply and rub on the skin. Many of these gels are either too brittle or sticky or do not absorb well in the skin.

There are hardly any hydrogel like products in a sheet / film form which may be transparent / translucent, without any supporting matrix base and which can be applied directly onto the skin or any part of the body, which adheres to the skin without slipping for a certain period of time and can be easily removed from the skin thereafter. Also, there are hardly any mention in the literature of gels in sheet / film form without any supporting matrix base which are extremely flexible and have good pliability i.e. can be folded several times and would not result in the breakage of the gel sheet. This is not revealed in the prior art.

JP patent No. 10-092366 of Akihiro et al. describes a transparent sheet type cosmetic for non lips. It consists of a gelling agent (chosen from copolymer of acrylamide [5 – 40%, preferably 10 – 25%] and a cross linking monomer [0.3% or less], a polyacrylamide over which the bridge was constructed by the epoxy cross linking agent [3% or less], a carrageenan [0.5 – 20%, preferably 1 – 10%], hylauronic acid and its salt, a deoxyribonucleic acid and its salt); a wetting agent (glycerol [0.1 – 80%], diglycerol, polyethylene glycol, 1,3 – butylene glycol, sorbitol); a

bioactive component [0.001 – 80%] (slimming agent, moisturizer, dark circle remover etc.) and water. The liquefied gel is poured into a mould – solidified by back cooling, applying heat or heating and carrying out a polymerizing reaction (thermal polymerization, azo polymerization initiators) or irradiating light (UV irradiation) and carrying out a polymerization.

JP patent No. 63301805A by Takashi et al., describes addition of cosmetic pack material to a substrate capable of forming a thin film composed of KONJAK (Starch of Devil's Tongue) gel, carrageenan and hydrolyzed gelatine and subjecting the mixture to heating, cooling, drying and rolling. This is a dry pack which can be peeled off after pasting to the skin.

JP patent No. 2000-119166 by Yoichi et al., describes a fluid gel comprising of (A) a polysaccharide to form a disintegrable gel as a gel main agent, and (B) a water soluble thickening agent to improve feel & stability. Component A comprises of agar, carrageenan, gellan gum and sodium alginate and Component B comprises of native Gellan gum, Xanthan gum, Locust bean gum, a carboxyvinyl polymer, an acrylic acid / alkyl methacrylic acid methacrylate copolymer, Hydroxy ethyl cellulose, and Hydroxy propyl cellulose. This composition is used as a skin care constituent. During manufacturing, ingredients are heated, cooled and sheared to make a uniform and smooth viscosity gel to give good homogeneity and good spreading properties.

GB patent No. 2384705 by Levy et al., is a cosmetic composition comprising of gellan gum and carrageenan along with a structuring agent (like polyhydric alcohols, glycerine sorbitol and glycolic acids) to reduce gel brittleness; sequestering agents and pH regulator. The ratio of gellan gum: carrageenan is 1:1 – 1:8, preferably, 1:2 – 1:6 & more preferably 1: 2 – 1:3. Concentration of gellan gum is 0.1 – 0.5% by weight, preferably 0.1 – 0.2%. Carrageenan is used in a concentration of 0.2 – 1.0%, preferably 0.2 – 0.5%. pH of the composition 3.5 – 7.5. It has been specifically mentioned that other gums like Xanthan gum, Locust bean gum, and tragacanth are not suitable as they give a cloudy product.

JP patent No. 04279509 A2 by Tadanobu et al., have described the use of Xanthan gum (0.2 – 1.5% by weight, preferably 0.3 – 0.5% by weight) and or Locust bean gum and iota carrageenan (0.2 – 1.0% weight, preferably 0.4 – 0.8% weight) in the preparation of an oil in water type emulsion for cosmetic purposes. This composition renders the cosmetic emulsion to exhibit elasticity and semi fluidity in the stationary phase.

JP patent No. 2000-273033 by Tadashi et al. describes a gel having salt tolerance, capable of having inorganic salt at high concentration and freely adjusting viscoelasticity thereof to give high adhesiveness to the skin. The composition contains carrageenan as a gelling component, an alkali metal ion such as potassium or caesium ion, a functional component such as deep sea water containing natural mineral component, functional water ionized with electrolysis and / or Tourmaline impalpable powder, oil & plant extracts and trehalose.

Sullivan Jr. (USP 3944427) have disclosed gellable or gelled composition comprising of a liquid medium, agar (0.5 - 5.0% weight) and natural gum – gel forming agents like Xanthan gum and Locust bean gum (0.1 – 0.5% weight). Gels are formed by heating the composition to a temperature above the gel critical temperature and subsequently cooling to a temperature below the setting temperature. The gels are used as carriers for different types of photo-processing solutions and therapeutic solutions.

Several patents (USP 4474751 by Haslam et al., USP 4188373 by Krezanoski et al., and EA 0002004B1 by Galin et al) have described in-situ gelation and semi solid gels for ophthalmic drug delivery systems. These are compositions which exist as a liquid at room temperature, but when applied in the eye becomes a solid gel at human body temperature. The Sol-gel transition temperature and rigidity of the gel can be modified by changes in the polymer concentration combined with pH and ionic strength of the solution. The polymers used for these preparations are – Polyoxyethylene – polyoxypropylene block copolymer of poly (oxyethylene) – poly (oxypropylene) and other viscoelastic polymers like Hyaluronic acid, Carboxymethyl Cellulose, Chondroitin sulphate, heparin, Carboxymethyl Guar, Xanthan gum, guar gum, agarose, welan gum, carrageenans, starch phosphates, polysaccharides, polypeptides, and polymers and copolymers of acrylamide, acrylic acid, methacrylic acid and the like. Therapeutic drugs / anaesthetic agents are incorporated and this system provides sustained drug delivery to the eye without flowing out.

Combinations of gums and carrageenan have been used in the food industry for several different purposes. WO 00/19838 by Ong et al., describes a hydrocolloid confectionery product with iota – carrageenan or mix of carrageenans and other hydrocolloids containing >50% iota – carrageenan. The other hydrocolloids used may be Xanthan gum, gellan gum, Locust bean gum etc. to give elastic, bouncy, long lasting and non sticky characteristics similar to gelatine

like structures. The concentration of iota – carrageenan in the mix of carrageenan should be at least 60%, preferably 70% and more preferably 80 – 90%. The amount of carrageenan in the confectionery product may be from 0.1 – 5%, preferably 0.25 – 4.0%, and more preferably 0.5 – 3.0% by weight. The other components of this invention comprises in addition to iota carrageenan, water, sugar, glucose syrup, flavours and acids. This product is cooked to form jams, jellies etc.

But, in the patent by Ong et al., the concentration of other hydrocolloids like Xanthan gum, Gellan gum, Locust bean gum etc is not mentioned. Neither any specific ratios between iota – carrageenan and other hydrocolloids is mentioned. Moreover, in our present invention, kappa carrageenan is mainly preferred.

WO 02/30214 A1 by Grazela et al., describe a gelatin free gummy confectionery product using combination of Gellan gum and Carrageenan (especially nu &/or nu/iota carrageenan). The ratio of Gellan gum: Carrageenan used is 1: 2 – 1:12, with pH 3 – 4.5, preferably 3.7 – 4.0. The composition also contains sugar, glucose syrup, corn syrup, high fructose corn syrup, juice concentrate etc.

US Patent No. 6685978 by Hauksson describes processes and composition for treating uncooked food products like meat, sea food, poultry etc by adding an aqueous composition comprising of thixotropic gel which has been shear thinned and added in the shear thinned condition. Also the composition doe not form a gel externally of the food product. This is basically a brining of meat wherein the salt is added along with a gelling material so as to maintain the product aesthetics. Gellable polysaccharides include carrageenans in combination with Locust bean gum, Xanthan gum, Cassia gum or Konjak gum, flour of sea weeds, fruit or vegetable powder containing polysaccharides gelling pectins, gellan gums and the like.

It could be observed that the prior art known compositions were made as preformed moulded shapes which had inherent size restrictions. The prior art known compositions were also either too rigid, or too gummy or brittle. Hence, it does not have the pliability or the flexibility in handling and using. Hence a need was felt to develop a transparent / translucent composition which can overcome the above mentioned pitfalls of the prior art.

Therefore the main objective of the present invention is to provide novel synergistic transparent / translucent hydrogel composition capable of converting to sheet / film which is useful for cosmetic and / or medical purposes

Another objective of the present invention is to provide novel synergistic transparent / translucent hydrogel composition capable of converting to sheet / film which has excellent skin adhesivity (clingability) and ability to mould itself to the body contours without falling off from the skin.

Yet another objective of the present invention is to provide novel synergistic transparent / translucent hydrogel composition capable of converting to sheet / film which has good elasticity, excellent break strength (can be folded several times without breaking off) & no tackiness

Another objective of the present invention is to provide novel synergistic transparent / translucent hydrogel composition capable of converting to sheet / film which can be readily applied as a cosmetic / medicinal product in any part of the body for a length of time and can be easily removed without damaging or affecting the underlying cells or tissues..

Another objective of the present invention is to provide a method of preparing novel synergistic transparent / translucent hydrogel composition which is capable of converting into sheet / film form useful for cosmetic and / or medical purposes.

Still another objective of the present invention is to provide a method of preparing novel hydrogel sheet / film from novel synergistic transparent / translucent hydrogel composition which has excellent skin adhesivity (clingability) and ability to mould itself to the body contours without falling off from the skin.

It is a very well known fact that

(i) Several gellable polysaccharides like Gellan gum, Xanthan Gum, Gelatin, pectin & the like do not form elastic gels or non gelling individually

(ii) kappa carrageenan (a gellable polysaccharide), forms brittle gels that break easily; and

(iii) polymer & copolymer of acrylic acid / acrylate esters such as polyacrylic acid, cross linked polymers of acrylic acid, copolymers of acrylic acid, copolymers of carboxylic acid containing acrylic esters, cross linked copolymers of acrylic acid

and acrylate esters, and the like e.g. carbopol do not solidify to be cast into sheets.

By the sustained R & D undertaken by us, we observed, surprisingly, that when the above said ingredients namely (i) gellable polysaccharides which do not form elastic gels or non gelling individually, (ii) kappa carrageenan (a gellable polysaccharide) and (iii) polymer & copolymer of acrylic acid / acrylate esters do not solidify to be cast into sheets when combined together in a specific ratio results in an extremely soft, elastic synergistic transparent / translucent hydrogel composition which can be converted into sheet / film form with excellent skin adhesivity.

In other words, the novel synergistic transparent / translucent hydrogel composition resulting from such combinations are binary or ternary and are the following:

(i) Any one of the gellable polysaccharide which do not form elastic gels or non gelling individually and kappa carrageenan (a gellable polysaccharide)

(ii) Polymer & copolymer of acrylic acid / acrylate esters which do not solidify to be cast into sheets, individually and kappa carrageenan (a gellable polysaccharide).

The above said compositions are binary compositions

(iii) Any one of the other gellable polysaccharide which do not form elastic gels or non gelling individually, kappa carrageenan (a gellable polysaccharide), and polymer & copolymer of acrylic acid / acrylate esters which do not solidify to be cast into sheets, individually.

(iv) Any two gellable polysaccharides which do not form elastic gels or non gelling individually and kappa carrageenan (a gellable polysaccharide).

The above said compositions are ternary compositions

The above mentioned combination results in a synergistic transparent / translucent hydrogel composition is hitherto unknown in the prior art. The sheet / film prepared from such a synergistic hydrogel composition has excellent skin adhesivity (clingability) and ability to mould itself to the body contours without falling off from the skin , is also not hitherto known in the prior art

It should be noted that the novel hydrogel composition is not a mere admixture of the components used resulting only the aggregation of the properties of the components thereof or for a process for making the said composition. The admixture of the components in a specific ratio imparts synergy to the resulting translucent / transparent composition which facilitates forming a film / sheet which is extremely soft, elastic and having excellent skin adhesivity. In addition, the film / sheet so prepared have excellent skin adhesivity (clingability) and ability to mould itself to the body contours without falling off from the skin. The novel transparent / translucent synergistic hydrogel composition made in the form of sheet / film has excellent break strength (can be folded several times without breaking off) thereby making it easy to handle & has no tackiness. Such a unique synergistic hydrogel composition made in the form of sheet / film is not hitherto known

- **Summary of the invention**

Accordingly, the present invention provides novel synergistic transparent / translucent hydrogel composition capable of making it into sheet / film useful for cosmetic and / or medical purposes having excellent skin adhesion, with ability to mould to the contours of the body without falling off, with good elasticity, excellent break strength and no tackiness, which comprises any one of the gellable polysaccharide which do not form elastic gels or non gelling individually and (ii) kappa carrageenan (a gellable polysaccharide) in the ratio in the range of 1 : 7 to 1 : 20 the concentration of Kappa carrageenan being in the range of 0.001% to 10% by weight of the composition , and that of other gellable polysaccharides being in the range of 0.0001% to 5% by weight of the composition , the pH of the above said compositions being in the range of 3 to 12

According to anther embodiment of the present invention there is provided novel synergistic transparent / translucent hydrogel composition capable of making it into sheet / film useful for cosmetic and / or medical purposes having excellent skin adhesion, with ability to mould to the contours of the body without falling off, with good elasticity, excellent break strength and no tackiness, which comprises a polymer & copolymer of acrylic acid / acrylate esters which do not solidify to be cast into sheets individually and (ii) kappa carrageenan (a gellable polysaccharide), in the ratio range of 1 : 2 to 1 : 20 and the concentration of the polymer / copolymer of acrylic acid / acrylate esters being in the range of 0.001% to 4.8% by weight of

the composition and the concentration of kappa carrageenan, being in the range of 0.001% to 10% by weight of the composition the pH of the composition being in the range of 3 to 12

According to yet another embodiment of the present there is provided novel synergistic transparent / translucent hydrogel composition capable of making it into sheet / film useful for cosmetic and / or medical purposes having excellent skin adhesion, with ability to mould to the contours of the body without falling off, with good elasticity, excellent break strength and no tackiness, which comprises of (i) One or two of the other gellable polysaccharide which do not form elastic gels or non gelling individually, (ii) kappa carrageenan (a gellable polysaccharide), and / or (iii) a polymer & copolymer of acrylic acid / acrylate esters which do not solidify to be cast into sheets , individually , in the ratio in the range of 1: (4:1 to 20 :1) and the concentration of gellable polysaccharide being in the range of 0.0001% to 5.0% by weight of the composition; the concentration of kappa carrageenan being in the range of 0.001% to 5.0% by weight of the composition , and the concentration of polymer and copolymer of acrylic acid / acrylate esters being in the range of 0.0001% to 4.8% by weight of the composition ,the pH of the above said compositions being in the range of 3 to 12

According to another embodiment of the present invention there is provided a method of preparing the novel synergistic hydrogel composition which comprises

(i) Dispersing other gellable polysaccharides which do not form elastic gels or non gelling individually and / or a polymer and copolymer of acrylic acid or acrylate esters in an appropriate amount in water at room temperature or by heating it to at least 50° C depending on the nature of the polysaccharide or polymer used.

(ii) Adding Kappa carrageenan to the resulting dispersant at a temperature in the range of about 50° C - 60° C in an appropriate amount

(iii) Stirring the resulting mixture and continuing the heating to a temperature in the range of 80 to 100° C so that all the dispersed gums are completely dissolved resulting in a homogeneous molten mixture and stop heating and allow to cool to a temperature in the range of 60 – 70 deg C,

(iv) Adjusting the pH of the resulting homogenous molten mixture to the desired level in the range of 3 to 12, by the addition of appropriate buffers, and if desired adding the other auxiliary agents

(v) Cooling the resulting molten mixture to a temperature above the solidification temperature of the gums used, to give the novel synergistic hydrogel composition

According to yet another embodiment of the present invention there is provided a process for the preparation of transparent / translucent hydrogel sheet / film which comprises pouring the homogenous molten mixture obtained in step (iv) in the process defined above into a mould of appropriate shape of the desired sheet / film by conventional manner and allowing it to solidify at room temperature and removing the transparent / translucent hydrogel sheet / film from the mould.

- **Detailed description of the invention**

Carrageenan is naturally occurring family of carbohydrates extracted from red seaweed (*Rhodophycae spp.*) and available in three distinct forms:

1. Kappa Carrageenan – forms strong rigid gels which are brittle and undergoes syneresis. It forms slightly opaque gels.
2. Iota Carrageenan – forms clear, soft elastic gels with no syneresis and are freeze – thaw stable.
3. Lambda Carrageenan – non gelling thickeners with good freeze – thaw stability.

We have observed that use of Iota and Lambda carrageenan in the composition does not result in any synergism and does not form transparent / translucent sheet / film and hence not used in the composition. Accordingly only the use of Kappa Carrageenan results in a synergistic transparent / translucent hydrogel composition of the present invention.

According to another embodiment of the present invention the other gellable polysaccharide which do not form elastic gels or non gelling individually used in the composition may be selected from one or more of Gellan gum, Xanthan gum, Gelatin, pectin, Locust bean gum, Cassia gum, preferably, gellan gum and xanthan gum.

Gellan gum is a polysaccharide manufactured by microbial fermentation of the micro organism *Sphingomonas elodea*. Gellan gum is available in 2 types – Low and high acyl content. Low acyl gellan gum which is preferred in our composition forms hard, non-elastic, brittle gels; while high acyl gellan gum forms very soft, elastic and non-brittle gels.

Xanthan gum is a high molecular weight polysaccharide produced by microbial fermentation of a carbohydrate by the micro organism *Xanthomonas campestris*. It is considered to be non gelling and used as a viscosity modifier as it has weak gel shear thinning properties.

The polymer & copolymer of acrylic acid / acrylate esters which do not solidify to be cast into sheets, individually, used in the composition of the present invention may be selected from the class of polyacrylic acid, cross linked polymers of acrylic acid, copolymers of acrylic acid, copolymers of carboxylic acid containing acrylic esters, cross linked copolymers of acrylic acid and acrylate esters and the like, e.g., Carbopol.

In binary composition the preferred ratio of gellan gum / xanthan gum: Carrageenan may be between 1:8 – 1:15, and more preferably between 1:8 – 1:10. The preferred ratio of polyacrylic acid, cross linked polymers of acrylic acid, copolymers of acrylic acid, copolymers of carboxylic acid containing acrylic esters, cross linked copolymers of acrylic acid and acrylate esters, e.g., Carbopol : Carrageenan may be between 1:3 – 1:10 and more preferably between 1:4 – 1:7.

The preferred concentration of gellan gum used in the binary composition may be between 0.01% – 2% by weight and more preferably between 0.05% - 1% by weight of the composition. The preferred concentration of Xanthan gum in the binary composition may vary between 0.001% - 1% by weight and more preferably between 0.01% - 0.5% by weight. The preferred concentration of carrageenan in the binary composition may be between 0.01% - 5% by weight and more preferably between 0.1% - 3% by weight of the composition. The preferred concentration of carbopol in the binary composition may be between 0.01% - 3% by weight and more preferably between 0.05% - 2% by weight of the composition.

It is more preferable to have a ternary combination of polysaccharides and / or polyacrylic acid, cross linked polymers of acrylic acid, copolymers of acrylic acid, copolymers of carboxylic acid containing acrylic esters, cross linked copolymers of acrylic acid and acrylate esters, e.g., Carbopol to give excellent hydrogel films with extremely good skin adhesivity and elasticity.

In the ternary combinations, the preferred ratio of gellan gum / carbopol: (carrageenan: xanthan gum) may be 1: (5:1 – 12:1) and more preferably in the ratio 1: (6:1 – 10:1).

The preferred concentration of gellan gum / carbopol in the ternary combination may be between 0.001% - 2% by weight and more preferably between 0.01% - 1% by weight of the

composition. The preferred concentration of carrageenan in the ternary composition may be between 0.01% - 3% by weight, and more preferably between 0.1% - 2% by weight of the composition. The preferred concentration of xanthan gum in the composition may vary between 0.001% - 2% by weight, and more preferably between 0.01% - 1% by weight of the composition.

The pH of the novel synergistic composition of the present invention may be, preferably between 4.0 – 10.0, and more preferably between 5.0 – 8.0. The pH may be adjusted by adding suitable acid or buffer or both. Suitable acids which can be used include, but not limited to citric, adipic, malic, lactic acid and the like. Suitable buffers which can be used include but not limited to sodium citrate, potassium citrate and the like.

The novel synergistic hydrogel composition of the present invention may also contain sequestering agent like, but not limited to EDTA. The novel synergistic composition of the present invention may also comprise the use of preservatives to prevent microbial contamination. Preservatives may include but not limited to methyl chloro isothiocyanate / methyl isothiocyanate (Kathon CG), DMDM Hydantoin (Glydant), Methyl paraben, triclosan and the like. They may be used in a concentration range of about 0.0001% to 0.5% of the composition.

The novel synergistic hydrogel composition of the present invention may also comprise of functional ingredients to impart specific benefits to the applied part. This may include but not limited to natural (including plant & marine origin) and / or synthetic ingredients like vegetable oils like Avocado oil, Olive oil, Wheat germ oil, Safflower oil, Castor oil, Canola oil etc.; volatile / essential oil like Tea tree oil, Lemon grass oil, Orange oil, etc.; extracts of plant and plant parts like Gingko biloba extract, Aloe extract or juice, Stevia extract, Potato extract, Rose extract, cucumber extract / juice, Strawberry extract, Papaya extract etc.; estradiol and its derivatives; α / β – hydroxyl acids like glycolic acid, citric acid, lactic acid, salicylic acid etc.; Perfumes, Hyaluronic acid, Chondroitin sulphate; Dermatan sulphate; Mucopolysaccharides and its salts such as heparin sulphate, heparin, keratin sulphate; Protein and its derivatives such as collagen, elastin, keratin, sorbitol, an inositol , trehalose, urea, pyrrolidone carboxylic acid and its salt; Amino acid such as glycine and its salt or derivative, serine and its salt or derivative, arginine and its salt or derivative etc.; Ceramides; cerebrosides; Vitamins; menthol; Propolis; Lactoferrin; enzymes such as papain etc.; Ingredients with cosmetic or skin care benefits such

as skin lightening, skin brightening, skin tightening, depilatory, anti-acne / pimple, anti-aging, anti-pollution, anti-wrinkle, skin-firming, anti-cellulite, anti-inflammatory, antimicrobial, Synthetic & natural immuno-modulators like cytokines, lymphokines, immunoglobulins, interferons, cytokines, colony stimulating factors, growth factors, plant sterols & sterolins, ginseng root, German Chamomile tea, reishi mushroom extract, olive leaf extract, Topical immunomodulators such as tacrolimus and pimeocrolimus etc., astringent, circulation accelerator, dark circle remover, moisturizers, deodorant, antiperspirant, suntan, after sun protective agents; anti-burns or burn healing ingredients, synthetic coated beads; pearlescents for aesthetic / functional benefit; colorants and the like. They may be used in a concentration range of about 0.0001% to 95% in the composition.

The translucent / transparent hydrogel sheet / film made from the novel synergistic transparent / translucent hydrogel composition can be applied to any external part of the body where it clings to the skin with high adhesivity. The presence of functional ingredients with their actives as described above, would deliver their active on the applied area e.g. on applying to face or eyes, it delivers non limiting benefits like moisturizing effect, a cooling effect, fresh feel to the skin etc.

It is desirable to remove the translucent / transparent hydrogel sheet after leaving on the body for an appropriate period of time as deemed suitable for the application.

- **Distinguishing features of the present invention as compared to the prior art**

The present invention differs from the patent of Akihiro et al., (JP 10-092366) referred to earlier in that it does not contain copolymer of acrylamide, a cross linking monomer, an epoxy cross linking agent and a wetting agent in its composition. It is also different from this patent in that it does not require special reactions for solidification of the hydrogel like back – cooling, polymerization reaction or irradiation. As compared to the above prior art the present invention contains Xanthan gum) and the film / sheet formation from the composition is by simple air cooling below 50° C which solidifies the product into sheets / films when poured into appropriate sheet shaped moulds.

As compared to JP patent No. 63301805A, the composition of the present invention does not contain KONJAK starch and it is also not in a dried form. The composition of the present invention is a wet hydrogel sheet / film which can be readily applied on to the skin immediately.

Unlike the fluid gel composition described in JP patent 2000 – 119166, the present invention is a not in a fluid gel form, but it forms a solid sheet/ film. Also, during preparation, it is not sheared to form a viscous product which can be applied and spread on to the skin. The composition described in the present invention is a ready to apply & use product in a sheet / film form.

Unlike the composition described in the present invention, the composition described in the patent by Levy et al., is not a gel in a sheet / film form. The product disclosed in the patent of Levy et al., is to be applied and spread on to the skin by making a lotion or cream and pumped out through a dispenser. The product forms between the present invention and that described by Levy et al are totally different in character.

The invention as described in the patent of Tadanobu et al., describes oil in water emulsion, while the composition of the present invention is not an emulsion at all, but a hydrogel in a sheet / film form. Hence the two inventions are different.

The invention disclosed in the JP patent no 2000-273033 of Tadashi et al. differs from the present invention in that, the present invention does not describe the use of alkali metal ion, functional water ionized with electrolysis and / or Tourmaline impalpable powder or trehalose in its composition. The composition of the present invention also need not be applied and spread on the skin. It can be placed directly as a sheet / film on the skin.

As compared to the invention disclosed in the US Patent No. 3944427 of Sullivan Jr. the composition of the present invention does not contain agar as a solidifying agent.

The composition as described by Grazela e al., in their patent WO 02/30214 A1 is a composition not a sheet like structure, but a gummy structure. Also, they are using specifically nu or iota carrageenan, while the composition of the present invention is a sheet / film and uses Kappa carrageenan.

The invention disclosed in the US Patent No. 6685978 of Hauksson relates to composition used for food processing in a shear thinned condition which gels in situ, not externally. The composition of the present invention is totally different from that disclosed in the US Patent

As compared to many other prior art inventions referred earlier, the composition of the present invention does not exhibit a sol – gel property. It exists as a hydrogel which can be moulded into a sheet / film at room temperature which can be readily applied on the skin.

The details of the invention are given in the Examples given below which are provided to illustrate the invention only and should not be construed to limit the scope of the invention

- **Binary compositions of synergistic hydrogel composition made into sheet / film**

EXAMPLE 1:

INGREDIENTS	QUANTITY (%)
DM water	To 100
Gellan Gum	0.2
Kappa - Carrageenan	1.4

Method of manufacturing:

1. To the required quantity of water, add the weighed Gellan gum.
2. Mix well till it disperses completely.
3. Heat the resulting mixture up to 50°C.
4. Weigh kappa carrageenan and add to the above mixture. Mix well till it dissolves.
5. Continue heating till 70°C till all the ingredients dissolves completely and the resulting mixture is homogeneous.
6. Stop heat and allow the mixture to cool.
7. At about 55° C, the molten mixture is poured into a flat sheet shaped mould of desired shape and size and allowed to cool.
8. The mixture begins to solidify and takes the form of a sheet in the mould below 50° C. Allow it to cool to room temperature. The hydro gel sheet is removed from the mould. The hydro gel sheet is found to have extremely good elasticity, flexibility, break strength and no tackiness.

EXAMPLE 2:

INGREDIENTS	QUANTITY (%)
DM water	To 100
Kappa Carrageenan	0.6
Carbopol	0.2

Method of manufacturing:

1. To the required quantity of water, add the weighed quantity of carbopol.
2. Mix well till it disperses completely.
3. Heat the above mixture up to 50°C.
4. Weigh kappa carrageenan and add to the above mixture. Mix well till it dissolves.
5. Continue heating till 80° till all the ingredients till it dissolves completely and the mixture is homogeneous.
6. Stop heating and allow the mixture to cool
7. At about 55° C, the molten mixture is poured into a flat sheet shaped mould of desired shape and size and allowed to cool.
8. The mixture begins to solidify and takes the form of a sheet in the mould below 50° C. Allow it to cool to room temperature. The hydro gel sheet is removed from the mould. The hydro gel sheet is found to have extremely good elasticity, flexibility, break strength and no tackiness.

EXAMPLE 3:

INGREDIENTS	QUANTITY (%)
DM water	To 100
EDTA	0.05
Gellan Gum	0.2
Kappa Carrageenan	1.4
Sodium citrate	0.2
Citric acid	0.2
Sodium chloride	0.1
Kathon CG	0.09

Method of manufacturing:

1. To the required quantity of water, add EDTA and mix well.
2. Weigh Gellan gum. Add to the water with EDTA. Mix well till it disperses completely.
3. Heat the resulting mixture up to 50°C.
4. Weigh kappa carrageenan and add to the above mixture. Mix well till it dissolves.
5. Continue heating till 70°C till all the ingredients dissolves completely and the resulting mixture is homogeneous.
6. Add Sodium citrate, Citric acid and Sodium Chloride. Mix well till it dissolves.
7. Adjust the pH to 3.5

8. Stop heating and allow the resulting mixture to cool
9. As the mixture cools to about 60°C preservative (Kathon CG) is added and mixed well till it dissolves.
10. At about 55° C, the molten mixture is poured into a flat sheet shaped mould of desired shape and size and allowed to cool.
11. The mixture begins to solidify and takes the form of a sheet in the mould below 50° C. Allow it to cool to room temperature. The hydro gel sheet is removed from the mould. The hydro gel sheet is found to have extremely good elasticity, flexibility, break strength and no tackiness.

EXAMPLE 4

INGREDIENTS	QUANTITY (%)
DM water	To 100
Kappa Carrageenan	1.0
Xanthan gum	0.05
Sodium citrate	0.2
Citric acid	0.2
Sodium chloride	0.1
Sodium Hydroxide	0.1
Kathon CG	0.09
Perfume – Dew drop	0.2
Color – D&C Red, CI 17200 (1%)	0.01

Method of manufacturing:

1. Take the required quantity of water, and heat up to 50°C.
2. Weigh kappa carrageenan and add to water. Mix well till it dissolves.
3. Continue heating to 60°C, and add Xanthan gum. Mix well till it dissolves.
4. Continue heating till 75°C till all the ingredients dissolves completely and the resulting mixture is homogeneous.
5. Add Sodium citrate, Citric acid and Sodium Chloride. Mix well till it dissolves.
6. Adjust the pH to 6.0 by adding Sodium Hydroxide.
7. Stop heating and allow the mixture to cool
8. As the mixture cools to about 60°C preservative (Kathon CG), perfume and color are added and mix well till it dissolves.
9. At about 55° C, the molten mixture is poured into a flat sheet shaped mould of desired shape and size and allowed to cool.

10. The mixture begins to solidify and takes the form of a sheet in the mould below 50° C. Allow it to cool to room temperature. The hydro gel sheet is removed from the mould. The hydro gel sheet is found to have extremely good elasticity, flexibility, break strength and no tackiness.

EXAMPLE 5

INGREDIENTS	QUANTITY (%)
DM water	To 100
EDTA	0.05
Kappa Carrageenan	0.6
Carbopol	0.2
Sodium citrate	0.2
Citric acid	0.2
Sodium chloride	0.1
Sodium Hydroxide	0.15
DMDM Hydantoin	0.2
Perfume - Aqua fresh	0.2
Aloe juice	1.0
Polystyrene Beads	0.2

Method of manufacturing:

1. To the required quantity of water, add EDTA and mix well.
2. Weigh carbopol add to the water with EDTA. Mix well till it disperses completely.
3. Heat the above mixture up to 50°C.
4. Weigh kappa carrageenan and add to the above mixture. Mix well till it dissolves.
5. Continue heating till 80° till all the ingredients till it dissolves completely and the mixture is homogeneous.
6. Add Sodium citrate, Citric acid and Sodium Chloride. Mix well till it dissolves.
7. Adjust pH to 7.0 by addition of Sodium Hydroxide.
8. Stop heating and allow the mixture to cool
9. As the mixture cools to about 60°C add preservative (DMDM Hydantoin), perfume added and Aloe juice and mix well till it dissolves.
10. Also add the polystyrene beads and mix well till it is dispersed well in the mixture.
11. At about 55° C, the molten mixture is poured into a flat sheet shaped mould of desired shape and size and allowed to cool.
12. The mixture begins to solidify and takes the form of a sheet in the mould below 50° C. Allow it to cool to room temperature. The hydro gel sheet is removed from the

mould. The hydro gel sheet is found to have extremely good elasticity, flexibility, break strength and no tackiness.

- **Ternary compositions of synergistic hydrogel composition made into sheet / film**

EXAMPLE 6

INGREDIENTS	QUANTITY (%)
DM water	To 100
Gellan Gum	0.1
Kappa Carrageenan	0.5
Xanthan Gum	0.1

Method of manufacturing:

1. Weigh Gellan gum; add to the required quantity of water. Mix well till it disperses completely.
2. Heat the above mixture up to 50°C.
3. Weigh kappa carrageenan and add to the above mixture. Mix well till it dissolves.
4. Continue heating and at 60°C, add Xanthan gum. Mix well till it dissolves.
5. Continue heating till 85°C till all the ingredients dissolves completely and the resulting mixture is homogeneous.
6. Stop heating and allow the mixture to cool
7. At about 55° C, the molten mixture is poured into a flat sheet shaped mould of desired shape and size and allowed to cool.
8. The mixture begins to solidify and takes the form of a sheet in the mould below 50° C. Allow it to cool to room temperature. The hydro gel sheet is removed from the mould. The hydro gel sheet is found to have extremely good elasticity, flexibility, break strength and no tackiness.

EXAMPLE 7

INGREDIENTS	QUANTITY (%)
DM water	To 100
Carbopol	0.05
Kappa Carrageenan	1.0
Xanthan Gum	0.05

Method of manufacturing:

1. To the required quantity of water, add EDTA and mix well.

2. Weigh Carbopol; add to the water with EDTA. Mix well till it disperses completely.
3. Heat the above mixture up to 50°C.
4. Weigh kappa carrageenan and add to the above mixture. Mix well till it dissolves.
5. Continue heating. At 60°C, add Xanthan gum. Mix well till it dissolves.
6. Continue heating till 90°C till all the ingredients till it dissolves completely and the mixture is homogeneous.
7. Stop heating and allow the mixture to cool
8. At about 55° C, the molten mixture is poured into a flat sheet shaped mould of desired shape and size and allowed to cool.
9. The mixture begins to solidify and takes the form of a sheet in the mould below 50° C. Allow it to cool to room temperature. The hydro gel sheet is removed from the mould. The hydro gel sheet is found to have extremely good elasticity, flexibility, break strength and no tackiness.

EXAMPLE 8

INGREDIENTS	QUANTITY (%)
DM water	To 100
Gellan Gum	0.1
Kappa Carrageenan	0.5
Xanthan gum	0.1
Sodium citrate	0.2
Citric acid	0.2
Sodium chloride	0.1
Sodium Hydroxide	0.2
Kathon CG	0.09
Rose water	10.0
Aloe juice	2.0

Method of manufacturing:

1. Weigh Gellan gum; add to the required quantity of water. Mix well till it disperses completely.
2. Heat the above mixture up to 50°C.
3. Weigh kappa carrageenan and add to the above mixture. Mix well till it dissolves.
4. Continue heating and at 60°C, add Xanthan gum. Mix well till it dissolves.
5. Continue heating till 85°C till all the ingredients dissolves completely and the resulting mixture is homogeneous.
6. Add Sodium citrate, Citric acid and Sodium Chloride. Mix well till it dissolves.
7. Adjust pH to 9.5 with addition of Sodium Hydroxide.
8. Stop heating and allow the mixture to cool

9. As the mixture cools to about 60°C preservative (Kathon CG), Rose water and Aloe juice are added and mix well till it dissolves.
10. At about 55° C, the molten mixture is poured into a flat sheet shaped mould of desired shape and size and allowed to cool.
11. The mixture begins to solidify and takes the form of a sheet in the mould below 50° C. Allow it to cool to room temperature. The hydro gel sheet is removed from the mould. The hydro gel sheet is found to have extremely good elasticity, flexibility, break strength and no tackiness

EXAMPLE 9

INGREDIENTS	QUANTITY (%)
DM water	To 100
EDTA	0.05
Carbopol	0.05
Kappa Carrageenan	1.0
Xanthan gum	0.05
Sodium citrate	0.2
Citric acid	0.2
Sodium chloride	0.1
Sodium Hydroxide	0.22
DMDM Hydantoin	0.3
Perfume – Kesar Chandan	0.2
Glycine	0.2
Bitter Orange extract	1.0

Method of manufacturing:

1. To the required quantity of water, add EDTA and mix well.
2. Weigh Carbopol; add to the water with EDTA. Mix well till it disperses completely.
3. Heat the above mixture up to 50°C.
4. Weigh kappa carrageenan and add to the above mixture. Mix well till it dissolves.
5. Continue heating. At 60°C, add Xanthan gum. Mix well till it dissolves.
6. Continue heating till 90°C till all the ingredients till it dissolves completely and the mixture is homogeneous.
7. Add Sodium citrate, Citric acid and Sodium Chloride. Mix well till it dissolves.
8. Adjust pH to 10.5 by adding Sodium Hydroxide.
9. Stop heating and allow the mixture to cool
10. As the mixture cools to about 60°C preservative (DMDM Hydantoin), perfume, Glycine and Bitter orange extract are added and mix well till it dissolves.

11. At about 55° C, the molten mixture is poured into a flat sheet shaped mould of desired shape and size and allowed to cool.
12. The mixture begins to solidify and takes the form of a sheet in the mould below 50° C. Allow it to cool to room temperature. The hydro gel sheet is removed from the mould. The hydro gel sheet is found to have extremely good elasticity, flexibility, break strength and no tackiness.

EXAMPLE 10

INGREDIENTS	QUANTITY (%)
DM water	To 100
EDTA	0.05
Carbopol	0.1
Kappa Carrageenan	0.9
Xanthan gum	0.1
Sodium citrate	0.2
Citric acid	0.2
Sodium chloride	0.1
Sodium Hydroxide	0.25
Kathon CG	0.09
Lemon Grass Oil	0.1

Method of manufacturing:

1. To the required quantity of water, add EDTA and mix well.
2. Weigh Carbopol; add to the water with EDTA. Mix well till it disperses completely.
3. Heat the above mixture up to 50°C.
4. Weigh kappa carrageenan and add to the above mixture. Mix well till it dissolves.
5. Continue heating. At 60°C, add Xanthan gum. Mix well till it dissolves.
6. Continue heating till 100°C till all the ingredients till it dissolves completely and the mixture is homogeneous.
7. Add Sodium citrate, Citric acid and Sodium Chloride. Mix well till it dissolves.
8. Adjust pH to 12.0 by adding Sodium Hydroxide
9. Stop heating and allow the mixture to cool
10. As the mixture cools to about 60°C preservative (Kathon CG), and Lemongrass oil are added and mix well till it dissolves.
11. At about 55° C, the molten mixture is poured into a flat sheet shaped mould of desired shape and size and allowed to cool.
12. The mixture begins to solidify and takes the form of a sheet in the mould below 50° C. Allow it to cool to room temperature. The hydro gel sheet is removed from the mould.

The hydro gel sheet is found to have extremely good elasticity, flexibility, break strength and no tackiness.

- **Advantages of the invention**

The novel synergistic hydrogel composition of the present invention is,

1. A preformed transparent / translucent hydrogel with good elasticity, flexibility and break strength.
2. Extremely easy to handle due to its flexibility and break strength.
3. Non sticky, non tacky and imparts pleasant cool sensation to the skin. Being non-sticky it may be removed easily from the skin without damaging / injuring any underlying skin cells.
4. A ready to use gel which may be used in cosmetic / medical applications.
5. Can be cast in the form of a translucent / transparent hydrogel sheet / film for purposes of application on the skin. The resultant hydrogel sheet / film retains all the above mentioned characteristics of the gel composition.

We Claim

1. A novel synergistic transparent / translucent hydrogel composition capable of making it into hydrogel sheet / film useful for cosmetic and / or medical purposes having excellent skin adhesion, with ability to mould to the contours of the body without falling off, with good elasticity, excellent break strength and no tackiness, which comprises (i) any one of the gellable polysaccharide which do not form elastic gels or non gelling individually and (ii) kappa carrageenan (a gellable polysaccharide) in the ratio in the range of 1 : 7 to 1 : 20 the concentration of other gellable polysaccharides being in the range of 0.0001% to 5% by weight of the composition , and that of Kappa carrageenan being in the range of 0.001% to 10% by weight of the composition , the pH of the above said compositions being in the range of 3 to 12

2. A novel synergistic transparent / translucent hydrogel composition capable of making it into hydrogel sheet / film useful for cosmetic and / or medical purposes having excellent skin adhesion, with ability to mould to the contours of the body without falling off, with good elasticity, excellent break strength and no tackiness, which comprises (i) a polymer & copolymer of acrylic acid / acrylate esters which do not solidify to be cast into sheets individually and (ii) kappa carrageenan (a gellable polysaccharide), in the ratio range of 1 : 2 to 1 : 20 and the concentration of the polymer / copolymer of acrylic acid / acrylate esters being in the range of 0.001% to 4.8% by weight of the composition and the concentration of kappa carrageenan, being in the range of 0.001% to 10% by weight of the composition. The pH of the composition being in the range of 3 to 12

3. A novel synergistic transparent / translucent hydrogel composition capable of making it into hydrogel sheet / film useful for cosmetic and / or medical purposes having excellent skin adhesion, with ability to mould to the contours of the body without falling off, with good elasticity, excellent break strength and no tackiness, which comprises of (i) One or two of the other gellable polysaccharide which do not form elastic gels or non gelling individually, (ii) kappa carrageenan (a gellable polysaccharide), and / or (iii) a polymer & copolymer of acrylic acid / acrylate esters which do not solidify to be cast into sheets , individually , in the ratio in the range of 1: (4:1 to 20 :1) and the concentration of gellable polysaccharide being in the range of 0.0001% to 5.0% by weight of the composition; the concentration of kappa carrageenan being in the range of 0.001% to 5.0% by weight of the composition , and the

concentration of polymer and copolymer of acrylic acid / acrylate esters being in the range of 0.0001% to 4.8% by weight of the composition , the pH of the above said compositions being in the range of 3 to 12

4. A composition as claimed in claims 1 , 2 & 3 wherein the other gellable polysaccharide which do not form elastic gels or non gelling individually used in the composition is selected from one or more of Gellan gum, Xanthan gum, Gelatin, pectin, Locust bean gum, Cassia gum, preferably, gellan gum and xanthan gum, the pH of the composition being between 4.0 – 10.0, and more preferably between 5.0 – 8.0.

5. A composition as claimed in claims 2 & 3 wherein the polymer & copolymer of acrylic acid / acrylate esters which do not solidify to be cast into sheets, individually, used in the composition is selected from the class of polyacrylic acid, cross linked polymers of acrylic acid, copolymers of acrylic acid, copolymers of carboxylic acid containing acrylic esters, cross linked copolymers of acrylic acid and acrylate esters and the like, e.g., Carbopol.

6. A composition as claimed in claim 1 wherein the ratio of gellan gum / xanthan gum : Kappa Carrageenan is between 1:8 – 1:15, and more preferably between 1:8 – 1:10

7. A composition as claimed in claims 2 and 3 wherein the ratio of polyacrylic acid, cross linked polymers of acrylic acid, copolymers of acrylic acid, copolymers of carboxylic acid containing acrylic esters, cross linked copolymers of acrylic acid and acrylate esters : Carrageenan is between 1:3 – 1:10 and more preferably between 1:4 – 1:7.

8. A composition as claimed in claims 1 , 4 & 6 wherein the concentration of gellan gum used is between 0.01% – 2% by weight and more preferably between 0.05% - 1% by weight of the composition .

9. A composition as claimed in claims1 , 4 & 6 wherein the concentration of Xanthan gum is between 0.001% - 1% by weight and more preferably between 0.01% - 0.5% by weight.

10 A composition as claimed in claims 1, 2, 6 & 7 wherein the concentration of carrageenan in the binary composition is between 0.01% - 5% by weight and more preferably between 0.1% - 3% by weight of the composition.

11. A composition as claimed in claims 2, 5 & 7 wherein the concentration of carbopol in the composition is between 0.01% - 3% by weight and more preferably between 0.05% - 2% by weight of the composition.

12. A composition as claimed in claim 3 wherein the ratio of gellan gum / carbopol: (carrageenan: xanthan gum) is 1: (5:1 – 12:1) and more preferably in the ratio 1: (6:1 – 10:1).

13. A composition as claimed in claims 3 & 12 wherein the concentration of gellan gum / carbopol in the composition is between 0.001% - 2% by weight and more preferably between 0.01% - 1% by weight of the composition.

14. A composition as claimed in claims 3, 12 & 13 wherein the concentration of carrageenan in the composition is between 0.01% - 3% by weight, and more preferably between 0.1% - 2% by weight of the composition and the concentration of xanthan gum in the composition is between 0.001% - 2% by weight, and more preferably between 0.01% - 1% by weight of the composition.

15. A composition as claimed in claim 1 to 3 wherein the composition of the present invention contains sequestering agent like, but not limited to EDTA., preservatives to prevent microbial contamination .

16. A composition as claimed in claim 15 wherein the preservatives when used is selected from methyl chloro isothiocyanate / methyl isothiocyanate (Kathon CG), DMDM Hydantoin (Glydant), Methyl paraben, triclosan and the like in ranges from about 0.0001% to 0.5% of the composition and other ingredients to impart specific benefits to the applied part, which include natural (including plant & marine origin) and / or synthetic ingredients like vegetable oils like Avocado oil, Olive oil, Wheat germ oil, Safflower oil, Castor oil, Canola oil etc.; volatile / essential oil like Tea tree oil, Lemon grass oil, Orange oil, etc.; extracts of plant and plant parts like Gingko biloba extract, Aloe extract or juice, Stevia extract, Potato extract, Rose extract, cucumber extract / juice, Strawberry extract, Papaya extract etc.; estradiol and its derivatives; α / β – hydroxyl acids like glycolic acid, citric acid, lactic acid, salicylic acid etc.; Perfumes, Hyaluronic acid, Chondroitin sulphate; Dermatan sulphate; Mucopolysaccharides and its salts such as heparin sulphate, heparin, keratin sulphate; Protein and its derivatives such as

collagen, elastin, keratin, sorbitol, an inositol , trehalose, urea, pyrrolidone carboxylic acid and its salt; Amino acid such as glycine and its salt or derivative, serine and its salt or derivative, arginine and its salt or derivative etc.; Ceramides; cerebrosides; Vitamins; menthol; Propolis; Lactoferrin; enzymes such as papain etc.; Ingredients with cosmetic or skin care benefits such as skin lightening, skin brightening, depilatory, skin tightening, anti-acne / pimple, anti-aging, anti-pollution, anti-wrinkle, skin-firming, anti-cellulite, anti-inflammatory, antimicrobial, Synthetic & natural immuno-modulators like cytokines, lymphokines, immunoglobulins, interferons, cytokines, colony stimulating factors, growth factors, plant sterols & sterolins, ginseng root, German Chamomile tea, reishi mushroom extract, olive leaf extract, Topical immunomodulators such as tacrolimus and pimeocrolimus etc., astringent, circulation accelerator, dark circle remover, moisturizers, deodorant, antiperspirant, suntan, after sun protective agents; anti-burns or burn healing ingredients, synthetic coated beads; pearlescents for aesthetic / functional benefit; colorants and the like in the range of about 0.0001% to 95% in the composition.

17. A method of preparing the novel synergistic hydrogel composition as claimed in claims 1 to 16 which comprises

(i) Dispersing other gellable polysaccharides which do not form elastic gels or non gelling individually and / or a polymer and copolymer of acrylic acid or acrylate esters in an appropriate amount in water at room temperature or by heating it to at least 50° C depending on the nature of the polysaccharide or polymer used.

(ii) Adding Kappa carrageenan to the resulting dispersant at a temperature in the range of about 50° C - 60° C in an appropriate amount

(iii) Stirring the resulting mixture and continuing the heating to a temperature in the range of 80 to 100° C so that all the dispersed gums are completely dissolved resulting in a homogeneous molten mixture and stop heating and allow to cool to a temperature in the range of 60 – 70 deg C,

(iv) Adjusting the pH of the resulting homogenous molten mixture to the desired level in the range of 3 to 12, by the addition of appropriate buffers, and if desired adding the other auxiliary agents

(v) Cooling the resulting molten mixture to a temperature above the solidification temperature of the gums used, to give the novel synergistic hydrogel composition

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN 2010/000215

A. CLASSIFICATION OF SUBJECT MATTER
IPC[8]: ***A61K 8/73*** (2006.01); ***A61K 8/88*** (2006.01); ***A61Q 19/00*** (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC[8]: A61K, A61Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPI, EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB2384705A (LEVY A.), 06 August 2003 (06.08.2003) *Page 2, lines 13 - 19; page 3, lines 6 - 9; page 5, line 19 - page 9, line14; claims 26 - 43.*	1,4,6,8-10,14,15,17
Y	US2005/0118130A1 (UTZ F. et al.), 02 June 2005 (02.06.2005) *[0130] - [136], example 2, claims 1-5,9,25.*	1,4,6,8-10,14,15,17,
Y	US2006/0104931A1 (FUKUTOME T. et al.), 18 May 2006 (18.05.2006) *[0030] - [0034], [0083], [0093] - [0100], claims 1,4,12.*	1,4,6,8-10,14,15,17

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 November 2010 (24.11.2010)	25 November 2010 (25.11.2010)
Name and mailing address of the ISA/ AT **Austrian Patent Office** Dresdner Straße 87, A-1200 Vienna Facsimile No. +43 / 1 / 534 24 / 535	Authorized officer BAUMSCHABL F. Telephone No. +43 / 1 / 534 24 / 459

Continuation of first sheet

Continuation No. II:
Observations where certain claims were found unsearchable
(Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

Claims Nos.: 2,3,5,7,11-13,16 because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Neither the acrylic acid polymers of claims 2,3,5,7 and 11-13 are defined by technical, measurable parameters (e.g. molecular weight) nor the final "hydrogel sheet".
Carbopol is a trademark which is not allowed in claims.
Claim 16 is not clearly and concise: "triclosan and the like.."; "and other ingredients to impart specific benefits to the applied part".. "ingredients with cosmetic or skin care benefits", "functional benefit"."and the like".

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/IN 2010/000215

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
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