

ABSORBENT PRODUCTS, PROCESS AND COMPOSITIONS FOR
IMMOBILIZATION OF PARTICULATE ABSORBENTS

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The present invention relates to absorbent products, compositions and methods for immobilizing particulate absorbents and absorbent articles produced therefrom.

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Absorption of mobile aqueous liquids have conventionally been accomplished by the use of sponge or batting. More recently, water-insoluble but water-swellaable polymers having high absorptive capacity have been developed for immobilizing water and aqueous fluids. These polymers are particulate, i.e., pulverulent or granular and have no structural integrity. They are frequently referred to in the art as "superabsorbents," "hydrogels" or "hydrocolloids" and have been incorporated in the cellulosic absorbent structure in diapers, sanitary napkins and other absorbent articles to increase their absorptive efficiency. The expected advantage of incorporating these particulate materials is diminished by the shifting of the particulate materials generally requiring special construction to immobilize them within the structure of the articles. A process for decreasing the mobility of particulate absorbent materials and products in which the particulate absorbents are uniformly retained is desirable. In U.S. 3,900,030, there is described a catamenial tampon which utilizes an open-celled polymer foam which has the water-swellaable polymers imbedded therein. While this provides structural integrity to the absorbent polymer, versatility in application is governed by the foam carrier. Moreover, the method of disposition is dictated by the foam carrier.

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DESCRIPTION OF THE INVENTION

In accordance with the present invention there is provided an absorbent-immobilizing composition in liquid form, for use in preparing a product capable of absorbing and retaining large quantities of liquid, comprising:

(a) at least 25 to no greater than 125 parts by weight of a particulate water-insoluble, water-swallowable absorbent acrylate polymer having a gel capacity of at least 10 provided that the polymer is not a hydrolysed starch/polyacrylonitrile graft copolymer, and

(b) 100 parts by weight of a liquid polyhydroxy organic compound having vicinal hydroxy groups.

The immobilizing compositions may be employed to form novel products in which the absorbent has been converted to a non-particulate immobilized form, i.e. an absorbent bearing solidified structure.

In the absorbent-immobilizing compositions preferably from 40 to 80 parts by weight of the polymer absorbent are employed for every 100 parts by weight of the liquid polyhydroxy organic compound.

The absorbent-immobilizing composition may be cast, coated or cold extruded on an appropriate surface to obtain free films or sheets, or may be coated on the ultimate surface, e.g., a substrate to form a film coating. The products have structural integrity on solidification, have superior absorptive efficiency, are self-supporting, and are degradable disposable as hereinafter described.

The absorbent products are structurally stable solids, resilient and somewhat elastic, which rapidly swell on absorption of fluid. They have the property of being degradable in large excess of water to water-dispersible particles, providing a convenient means for disposition after the desired function has been accomplished. Absorbent articles having particulate absorbents immobilized by an absorbent-bearing solidified structure according to the present invention have high absorptive capacities which are not diminished by shifting and bunching of particulate absorbents accompanying transportation and handling prior to use. Moreover, the rate of absorption is substantially undiminished by the presence of a solidified structure enveloping the absorbent particles. The uptake of aqueous liquid is substantially instantaneous. This is wholly unexpected inasmuch as the presence of a carrier usually decreases the absorption rate.

The absorbent products are useful as the sole or supplementary absorbent panel material in absorbent articles such as bed pads, sanitary products, diapers, and incontinence pads. When the absorbent product is to be used as the sole absorbent panel, it may be applied directly to the ultimate substrate to be employed in the absorbent article, e.g. a diaper backing. Substrates suitable for such purposes include films, such as polyethylene film, non-woven cellulosic materials and wood-pulp materials. However, it may be employed in combination with wood-pulp panels used in batting

and with other absorbent materials while still having the effect of reducing size or thickness. A related application employing the absorbent product on a flexible substrate is in medical or surgical dressings and sponges.

The expression "absorbent" refers to water-insoluble, water-swellaable acrylate polymers as hereinafter described having an enhanced capacity for removing water or aqueous fluids. The water-insoluble, water-swellaable acrylate polymers are lightly cross-linked polymers containing a plurality of hydrophilic groups, such as carboxyl, carboxamide, sulfonate salt or hydroxyl groups, along the polymers chain in sufficient proportions so that the polymer would be water-soluble if it were not for the cross-linking thereof. In these polymers, the hydrophilic groups constitute at least twenty-five percent and up to seventy-two percent of their molecular structure. The materials are of sufficient molecular weight or degree of cross-linking to be water-insoluble while being water-swellaable. Many of the suitable materials are those which have been reported to have an average molecular weight per cross-linkage in the range of from 13,000 to 300,000, but are not limited thereto.

The most common and best known of such materials are polyacrylate modified polysaccharides and cross-linked synthetic polyacrylates. The water-insoluble, water-swellaable acrylate polymers have a gel capacity of at least 10. By "gel capacity" is meant the weight of aqueous fluid which can be imbibed and held per unit weight of polymer, i.e., grams of fluid per gram of polymer. Stated another way, the absorbent acrylate polymers have an absorbent capacity of at least 10 times the weight of the material in dry form. The capacity may be up to 1500 times or more of the weight of the material in dry form; commonly it is 15 to 70 times the dry weight. The materials are frequently spoken of in the art as "hydrogels", "hydrocolloids" or "superabsorbents". Many of the water-swellaable acrylate polymers are available commercially.

The polymers are used in particulate form. By "particulate" is meant a substance in the form of fine discrete particles. They may be variously shaped such as spherical, rounded, angular, acicular, irregular, or fibrous. The particles generally range in size from 1 micrometer to 2×10^4 micrometers in diameter or cross-section (largest

dimension when not spherical). The particles are preferably of finely divided powder of particles size of from 1 to 10^3 micrometers.

5 By "absorbent-immobilizing composition" is meant a composition containing a water-insoluble water-swellaable acrylate polymer in particulate form and a liquid polyhydroxy organic compound and which may contain minor amounts of non-essential additives hereinafter detailed. The
10 composition is the vehicle for immobilizing particulate absorbent.

The liquid polyhydroxy organic compound employed in the present invention is a high boiling liquid having at least two vicinal or
15 adjacent hydroxy groups. Suitable liquids include glycerol, ethylene glycol and propylene glycol. Glycerol and ethylene glycol are preferred.

The composition may have included therein minor amounts of other additives which may impart
20 desirable properties to the absorbent product. Thus, a surface active wetting agent, particularly non-ionic surface active agent may be included to enhance liquid uptake. A surface active agent is of particular advantage in
25 assisting vertical transport of liquids. Representative surface active agents are those commonly described such as alkyl aryl polyether alcohols or alkylphenyl ethers or polyethylene glycol, e.g. the reaction product of τ -octylphenol or nonyl-
30 phenol with ethylene oxide. Fine fibrous cellulose

such as cellulose flour, silicates and the like
also have similar effect. Activated charcoal or
other absorbent may be included for odor uptake.
Fragrance, coloring, etc., may be included for a
5 pleasing effect. Inert materials containing bound
water such as silicates and aluminum hydrate may
be employed to modify the texture of the sheet.
Similar results may be achieved employing slightly
wet ethylene glycol or glycerol, e.g. commercial
10 glycerine. If the absorbent immobilizing com-
position contains a low levels of pulverulent
absorbent, there is a slight tendency for the
absorbent to settle. The composition may be modi-
fied to include small quantities of materials to
15 affect its spreading properties. Suitable
viscosity modifiers include silicated powders,
clays, zinc oxide and inert fillers. Also, the
polyhydroxy compounds maybe modified with minor
amounts of liquid modifiers, such as ether glycols
20 and mineral oil, not contemplated as the esential
component of the instant compositions. Generally,
the additives, if employed, do not constitute more
than 25 percent of the total composition.

By "absorbent-bearing solidified structure"
25 is meant the solid resulting on solidification of
the liquid composition after application to a
substrate or carrier surface, or to a metal or
release coated surface for free film or sheet
formation. When the absorbent bearing solidified
30 structure is a film or sheet it may be in the form

of a continuous film or a discontinuous one; it may have a lattice-like form. Also, as hereinafter described, it may be in the form of a filament. The term "film" as herein employed contemplates a thickness up to about 0.254 mm (10 mils). The term "sheet" contemplates a thickness greater than 0.254 mm (10 mils). Preferred structures are sheets.

The process of immobilizing particulate absorbent and forming an absorbent bearing solidified structure is carried out by applying an absorbent-immobilizing composition comprising an acrylate absorbent and a liquid polyhydroxy organic compound, prepared by mixing the components together, onto a temporary or ultimate surface. The amount of acrylate absorbent employed depends in part of the viscosity of the liquid polyhydroxy organic compound used as vehicle as well as on the amount desired in the ultimate product while within the range previously set forth.

Compositions of polymer absorbent in liquid polyhydroxy organic compound have time-limited fluidity and mobility. They are preferably prepared within several hours prior to use or at least within 24 hours but some absorbent-immobilizing compositions remain in the liquid form for longer periods.

The liquid absorbent-immobilizing composition then may be applied to a temporary or ultimate surface. The ultimate surface is hereinafter referred to as substrate. For making a film, sheet or coated substrate, any method of application conventionally employed for coating or preparing films, e.g., knife-coating, spray-coating, reverse-roll coating, gravure-coating, cold extrusion coating or casting may be employed. Preferred methods are cold extrusion coating and knife-coating.

When use as a coating on a substrate is contemplated, the substrate is of materials generally employed for absorbent articles, such as cellulose, vinyl films, polypropylene, polyester, polyethylene, nylon, metal foils, elastomers, cloth, non-wovens of various fibers, and the like. Coating on a substrate may be of the entire surface of the substrate, in strips or in any other predetermined pattern. When use as a free film or sheet is _____

contemplated, the coating may be made on material previously coated with a release agent such as silicone or on a metal surface. The coated substrate or the coated sheet-forming surface is then subjected to time-temperature related conditions to transform the liquid composition into a solid immobilized absorbent structure in the form of a film, sheet or coating product.

The conversion of the liquid absorbent-immobilizing composition from a liquid-solid mixture to a solid film or sheet may take place at a temperature up to 79°C (175°F) in a period as short as 15 minutes but more usually over a period from 30 minutes to 24 hours, or at elevated temperatures, 175°F to 450°F (79°C to 232°C), preferably about 275°F to 400°F (135°C to 204°C) for a period of from a few seconds up to 15 minutes. When speed is desired, transformation of the liquid composition to a solid may be accomplished by exposure to heat in the range of about 200°F to 450°F (93°C to 232°C) for 1 to 60 seconds.

A factor affecting rate of solidification in addition to temperature is the amount of polymer absorbent. Compositions with high absorbent content, e.g., greater than about 50 parts per 100 parts of liquid polyhydroxy compound, solidify at ambient temperature in time measured in hours but with lower amounts of absorbent, there is increase in the time necessary for completion of a solidified structure formation. The solidified structure

has been found to be more quickly formed from the more viscous liquid polyhydroxy compounds. However, the ultimate polymer absorbent content of the solidified structure is generally lower with the more viscous polyhydroxy compound since it is difficult to form a homogeneous composition. Thus, for example, a film obtained from glycerol as polyhydroxy compound generally has less absorbent than that from ethylene glycol as polyhydroxy compound. However, as previously indicated, for maximum absorptive efficiency of the ultimate product, it is desirable that the liquid polyhydroxy compound be the major component. Preferred film or sheets are those containing from 40 to 80 parts by weight of absorbent per 100 parts by weight of polyhydroxy compound.

The particulate absorbent in the absorbent-bearing solidified structure is firmly retained in the film or lattice and is not subject to moving or shifting in the ultimate absorbent article and retains all the high absorptive capacity of the particulate absorbent.

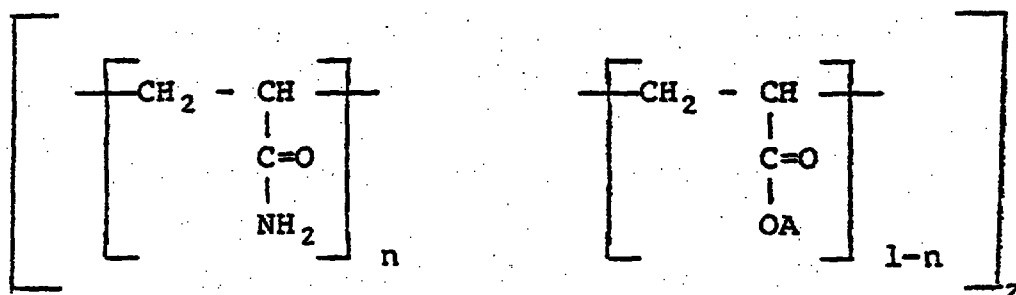
The liquid absorbent-immobilizing composition, in addition to being useful as starting material for the solidified absorbent bearing film or structure above described, is also useful in the liquid form and may be applied to dressings, skin, body exudates as well as to aqueous liquids from other sources.

Many water-insoluble, water-swellaable polymers suitable as absorbent are available commercially. They also may be prepared by cross-linking a pre-formed water-soluble, straight chain polymer, by polymerising an appropriate _____

monomer or a monomer with a co-monomer to effect simultaneous polymerization and cross-linking, or by incorporating a hydrophilic group into a completed polymer. An example of a later incorporation of a hydrophilic group to the completed polymer is the incorporation by sulfonation of a sulfonic acid moiety. When it is desired to have the hydrophilic group in the salt form, the polymer may be prepared first as an acid, ester, amide, or nitrile and the product hydrolyzed in whole or in part.

The absorbents have an acrylate group in their molecular structure. They may be completely synthetic acrylate polymers or acrylate modified polysaccharides, e.g., acrylate modified starch or acrylate modified cellulose. By "acrylate modified" is meant that an acrylate polymer or polyacrylate as hereinafter described has been grafted onto the polysaccharide. "Acrylate polymer" or "polyacrylate" as herein employed embraces not only polymers which contain acrylate salt groups but those which also may contain an acrylamide, acrylic acid, acrylic ester group or acrylonitrile group.

The preferred synthetic acrylate polymer absorbents are those which have a salt group, an acid group, or which have both an amide group and a salt or acid group. These have been represented in the literature, e.g., U.S. Patent 3,686,024, by the following formula:



where A is an alkali metal ion such as sodium or potassium, or is hydrogen, n is from ~~about~~ 0.5 to ~~about~~ 0.9, 1-n defines the extent of hydrolysis, and z is the number of mer units between cross-links.

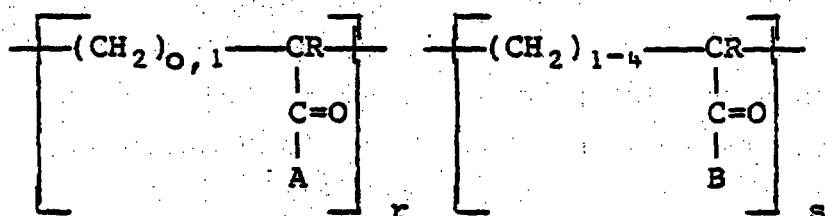
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The polyacrylate absorbent containing both amide and carboxylate groups may be prepared either (1) by aqueous polymerization of acrylamide with a difunctional organic cross-linker such as N,N'-methylenebisacrylamide in the
10 presence of a free radical catalyst to obtain a water-swella-
ble, cross-linked polyacrylamide, followed by partial hydrolysis in aqueous alkali to obtain a cross-linked polymer having both an amide and an alkali metal carboxylate groups as more fully described in U.S. Patent
15 3,247,171, or (2) by copolymerization of acrylamide and acrylic acid alkali metal salt in the presence of a cross-linking monomer such as N,N'-methylenebisacrylamide and a catalyst system such as 1:1 ammonium persulfate and
20 β -dimethyl-aminopropionitrile, also described in the aforesaid patent, or (3) by radiation polymerization and cross-linking as described in U.S. 4,192,727.

Polyacrylate absorbents also may be prepared by subjecting linear polyacrylate to high energy radiation cross-linking
25 as described in U.S. Patent 3,229,769, or to chemical polymerization and cross-linking as described in British Patent 719,330, or may be prepared by cross-linking of a previously prepared polyacrylamide.

30 Acrylate modified polysaccharides are those which have a polyacrylate chain grafted onto a cellulose or starch molecule. They are preferred graft copolymers of polysaccharides which have hydrophilic chains grafted thereon. By "hydrophilic chain" is meant a polymer chain obtained

from monomers which have a group which is water-soluble or becomes water-soluble on hydrolysis, e.g., carboxyl, sulfonic, hydroxyl, amide, amino, quaternary ammonium and hydrolysis products thereof. In the polysaccharides acrylate polymers, a hydrophilic chain of the general formula



is attached to the backbone of the cellulose or starch molecule through a carbon linkage. In the formula,

$\begin{array}{c} \text{O} \\ || \\ \text{---C---A} \end{array}$ and $\begin{array}{c} \text{O} \\ || \\ \text{---C---B} \end{array}$ independently represents an acid, ester, alkali metal, ammonium salt or amide group, each R independently is hydrogen or lower alkyl, r is an integer of from 0 to about 5,000 and s is an integer of from 0 to about 5,000, and r+s is at least 500.

The polysaccharide acrylate polymers may be prepared employing well known procedures for carrying out graft copolymerization of olefinically unsaturated chains onto cellulose and starch in which grafting of the hydrophilic material onto a starch or cellulose backbone is accomplished simultaneously with the formation of the hydrophilic polymeric material, and, if necessary, followed by hydrolysis. Thus, the polymers may be prepared by the polymerization of an appropriate polysaccharide with an appropriate acrylic monomer such as acrylonitrile, methacrylonitrile, methyl or ethyl acrylate, acrylic or methacrylic acid, or with acrylamide or methacrylamide, followed by alkaline hydrolysis or by the polymerization of alkali metal salt of acrylic or methacrylic acid with the appropriate polysaccharide.

The polymerization is carried out in the presence of a free radical catalyst system in an aqueous medium, or by irradiation (ultra-violet, gamma-, or X-radiation). Catalyst systems for employment in aqueous media usually comprise an inorganic oxidizing agent as initiator and an inorganic reducing agent as activator. Representative oxidizing agent initiators are inorganic persulfates, peroxides and alkali metal bromates and chlorates. Representative reducing agent activators are alkali metal bisulfites, sulfites, ferrous ammonium sulfate, and alkali metal thiosulfate.

In a method for carrying out graft polymerisation employing a catalyst system, the inorganic oxidizing agent initiator and the inorganic reducing agent activator each as an aqueous solution are alternately added to a reaction medium comprising a water-solution of an acrylate monomer, a co-monomer, a cross-linking monomer, and a dispersion of pulverulent or fibrous water-insoluble water-swellaable polysaccharide in water-immiscible organic liquid containing a minor amount of water-miscible solvent to obtain an acrylate modified polysaccharide product as more fully described in U.S. Patent 4,028,290. Other suitable methods for chemical catalytic graft polymerization may be found in U.S. Patent 3,256,372; 3,661,815; 4,076,663; 3,889,678 and 4,105,033.

Suitable polysaccharide acrylate polymers are those in which the hydrophilic chain loading on the backbone is in the range of from 10 percent by weight to 90 percent by weight, usually from 40 to 80 percent by weight of the polysaccharide acrylate polymer.

The water-insoluble, water-swellaable polymers prepared by any of the foregoing methods are generally obtained as stiff, brittle solids. These may be comminuted to the appropriate size. Preferably they are employed in the form of powder as previously defined, but may also be employed in other forms.

The liquid polyhydroxy compounds which are suitable from the currently available hydroxy compounds are quite limited and are substantially as previously defined. Commercial grades of vehicles are appropriate. It is not necessary to subject them to drying prior to use. Although liquids such as propylene glycol are operable in forming the desired film, the slowness in forming the film renders them less desirable in the invention directed to a process for immobilization.

When the solidified structure is a film it may be only part of a moisture receiving component of the absorbent article. However, as previously indicated, it may be obtained as a free film and be employed

in the ultimate absorbent article to constitute the entire moisture receiving portion thereof. It may be used wherever a dessicant is necessary.

- 5 The absorbent product as a free absorbent film or sheet is preferably formed by casting on a metal surface or coating on a silicone or other release agent covered surface a liquid absorbent-immobilizing composition comprising from 25 to 125 parts of
- 10 particulate absorbent polymer in 100 parts of liquid polyhydroxy organic compound and allowing the liquid composition to solidify either by heating at temperatures of from 79°C to 232°C (175°F to 450°F) for from a few seconds to about 15 minutes or standing
- 15 at temperature up to 79°C (175°C) for from 30 minutes to 24 hours. The absorbent product as a coating on a substrate is formed by coating on the ultimate substrate under similar conditions.
- 20 The absorbent product as a solidified structure may be in the form of filament or rope. Such form may be achieved readily by metering absorbent and polyhydroxy compound into a cold extruder with the die heated to a temperature in the range of 79°C to 232°C
- 25 (175°F to 450°F) and recovering the extruded filament or rope.

The actual amounts of absorbent in the compositions within the scope previously indicated is dependent on the level of absorption required in the ultimate environment. Thus, if the absorption is to be accomplished by a diaper, and the substrate is a diaper pad, the liquid absorbent immobilizing composition will contain absorbent sufficient to supply the desired absorptive capacity to the pad substrate. The products and processes are useful in the manufacture of numerous absorbent articles. They are especially useful where reduction in bulk of absorbent as well as high capacity is desirable, such as in articles to be worn. Thus, they are particularly useful for diapers and incontinence pads, but also for sanitary napkins, bandages and the like. In use in diapers, the absorbent product may be as a sole absorbent or as a component improving the quality of the existing absorbent. In the manufacture of diapers in which the film product is incorporated as an improvement to the liquid receiving portion of the diaper, the composition is applied to the surface of the aqueous liquid receiving portion of the article, namely the batting, the coated batting subjected to a heating cycle or to standing at temperatures up to 79°C (175°F), and the resulting modified batting provided with moisture impermeable backing

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5 and a moisture permeable top sheet. Alternatively,
the absorbent immobilizing composition may be
coated on a conventional non-absorbent moisture
impermeable diaper backing without batting and
thereafter laminated with a conventional moisture
permeable top sheet to provide a thin diaper.
Other techniques within the skill of those to whom
the invention is directed may be employed to
obtain new absorbent diapers.

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In the case of sanitary napkins, the absorbent
immobilizing composition may be applied to the
cellulosic absorbent surface and wrapped in a
conventional manner to produce a napkin of improved
absorptive capacity.

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In the case of bandages, the absorbent composition
may be coated onto an aqueous liquid permeable, but
a gel impervious material, e.g., non-woven fabrics
such as rayon or polyester fabrics, and then inserted
in the gauze bandage.

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The following examples illustrate the invention but
are not to be construed as limiting:

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EXAMPLES I-VI

Absorbent compositions set forth in Table A are
prepared.

**Amount of Components (parts
by weight)**

Component	I	II	III	IV	V	VI
Absorbent						
Starch Polyacrylate, + (SGP 502S, Henkel)	50					
Starch Polyacrylate + (Stasorb [®] , A.E. Staley)		25				
Cross-linked poly(Sodium, acrylate), (Flavorsab [®] , Stockhausen)			70			
Cross-linked Ionic Polyacrylate (Permasorb [®] AG, National Starch)				70		
Cross-linked Ionic Polyacrylate (Permasorb [®] ZO, National Starch)					30	
Starch Polyacrylate (35A 100, Grain Products)						
<u>Liquid Polyhydroxy Compound</u>						
Glycerol		100			100	
Ethylene Glycol	100		100	100		100
+Hydrolyzed polyacrylonitrile grafted to starch						

The products having the compositions identified in Table A are employed to coat substrates to produce absorbent articles as follows:

5 The products having the compositions of Examples I, III, and V are employed to coat diaper topsheet materials (a) a nonwoven fabric sheet comprising 0.167 to 0.334 tex (1.5 to 3.0 denier) rayon and containing 20 to 35 percent acrylate ester copolymer binder, and having a weight of 18 to 23 grams per square meter (15 to 19
10 grams per square yard), and (b) a nonwoven fabric sheet comprising 35 to 64 percent 0.167 to 0.334 tex (1.5 to 3.0 denier) polyester fiber, 14 to 40 percent 0.167 to 0.334 tex (1.5 to 3.0 denier) rayon
15 fibers and 20 to 30 percent of the same acrylate ester copolymer binder, and having a weight of 30 to 42 grams per square meter (25 to 35 grams per square yard). The modified topsheet materials when employed
20 to produce diapers or when employed as an insert in disposable diapers produce diapers having superior absorption properties and in which the particulate absorbents are found to be substantially completely immobile.

25 The product, having the composition of Example VI, is employed to saturate creped paper. The modified paper is employed to produce inserts for absorbent bed paddings.

30 The product having the composition of Examples IV is employed to coat polyethylene film to be employed as backing for disposable diapers. The modified backing is then overlaid with fluffed cellulose fibers forming a laminate therewith overlaid with nonwoven fabric web to produce a superior absorbent diaper.

35 The product having the composition of Examples II is employed to coat nonwoven fabric of rayon, above described, and thereafter laminated with the same material to use as inserts for napkins and bandages.

in use, each of the products exhibits superior absorption properties attributable to the particulate absorbent borne thereon. Further it is found that the particulate absorbent materials are not dislodged on storage, shipping or use.

5 A divisional application (No. 8406408, filed 12th March, 1984) derived from the present application discloses foamable compositions, methods of making foamed products and the foamed products. No claim is made in the present application to any of the subject matter claimed in this divisional application.

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CLAIMS

Subject to the foregoing disclaimer, we claim:

1. An absorbent-immobilizing composition in liquid form, for use in preparing a product capable of absorbing and retaining large quantities of liquid, comprising:
 - a) at least 25 to no greater than 125 parts by weight of a particulate water-insoluble, water-swellaible absorbent acrylate polymer having a gel capacity of at least 10, and
 - b) 100 parts by weight of a liquid polyhydroxy organic compound having vicinal hydroxy groups, provided that the polymer is not a hydrolysed starch/polyacrylonitrile graft copolymer.
2. A composition according to claim 1 in which the particulate absorbent polymer is employed in an amount of from 40 to 80 parts.
3. A composition according to claim 1 or claim 2, wherein the particulate absorbent polymer is starch polyacrylate.
4. A composition according to claim 1 or claim 2, wherein the particulate absorbent polymer is cellulose polyacrylate.
5. A composition according to claim 1 or claim 2, wherein the particulate absorbent polymer is polyacrylate.
6. A composition according to any one of claims 1 to 5, wherein the liquid polyhydroxy compound is glycerol.
7. A composition according to any one of claims 1 to 5, wherein the liquid polyhydroxy compound is ethylene glycol.
8. An absorbent film or sheet product prepared by coating or casting a composition according to any one of claims 1 to 7, and thereafter subjecting the coated or cast liquid to conditions for

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solidification by allowing to stand at a temperature up to 79°C (175°F) from 30 minutes to 24 hours or heating at a temperature from 79°C to 232°C (175°F to 450°F) for from a few seconds up to 15 minutes.

9. A process for decreasing the mobility of particulate absorbent in absorbent articles and improving moisture transport therein which comprises applying an absorbent-immobilizing composition according to any one of claims 1 to 7 onto a substrate or casting surface as a liquid layer to form a liquid film and thereafter subjecting the liquid film to solidifying conditions for a time sufficient to transform the liquid film into an absorbent-bearing solidified structure.

10. A process according to claim 9, in which the liquid film is heated at temperatures in the range of from 79°C to 232°C (175°F to 450°F) for from 1 to 60 seconds.

11. A process according to claim 9, in which the liquid film is allowed to stand at ambient temperature for from 60 minutes to 24 hours.

12. An absorbent composition substantially as hereinbefore described in any one of the foregoing Examples.

13. An absorbent product substantially as hereinbefore described in any one of the foregoing Examples.

14. A method of producing an absorbent product substantially as hereinbefore described in any one of the foregoing Examples.
