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(54) Title: POURABLE LIQUID VEHICLES

(57) Abstract: The present invention covers pourable liquid vehicles that can be combined with compositions, materials and substances. Among the benefits of such pourable liquid vehicles the compositions are retained on the moistened surface for a period of time sufficient to allow compositions, materials and substances to act on said surface, resisting erosion or run-off from additional moisture being applied. Such pourable liquid vehicles have a number of utilities including but not limited to cleaning and treating surfaces of objects as well as biological or living organisms, including living creatures.

POURABLE LIQUID VEHICLES

CROSS REFERENCE

This application claims priority under Title 35, United States Code 119(e) from Provisional Application Serial No. 60/153,260, filed September 11, 1999.

TECHNICAL FIELD

Concentrated levels of polyoxyalkylene block copolymers are useful in vehicles incorporated into products that are designed to deliver compositions, materials and substances to moistened surfaces and aqueous environment. Acquiring moisture during use, the vehicle becomes sufficiently transformed from a liquid to a gel-like form that provides the a benefit to the user. For example, mucosal surfaces of the body contain sufficient water to allow the pourable liquid vehicle comprising concentrated polyoxyalkylene block copolymers to be effectively delivered to the desired site wherein the accompanying compositions, materials and substances tenaciously adhere to the moistened surfaces and resist dissolution or erosion by water or biological fluid. Such uses include, but are not limited to the delivery of personal health care compositions, formulations and compounds including, but not limited to, pharmaceuticals (OTC and prescription), nutrients and the like.

In the discipline of pharmaceutical compositions there are a wide variety of dosage forms. Examples include tablets, capsules, elixirs, syrups, liquid-filled capsules, suspensions, coated tablets or capsules for administration by mouth; gels, rinses, dentifrices, lozenges, sprays, medicated lollipops, liquid filled capsules for intra-oral administration; gels, suspensions or solutions for intra-ocular or intra-aural administration; suppositories and douches or enemas for intra-rectal or vaginal administration; and creams, ointments, gels, lotions and patches for topical application on the skin and scalp; and liquid suspension or solutions for injection by syringe, nasal gels, solutions, or suspensions for application into the nose with special applications or sprayers.

The majority of these compositions are in the physical form of a fluid having a viscosity ranging from pourable liquids to stiff gels. Pourable liquids are often preferred since they are in

The majority of these compositions are in the physical form of a fluid having a viscosity ranging from pourable liquids to stiff gels. Pourable liquids are often preferred since they are in the best form to be administered. For example, only liquids, or perhaps low viscosity gels, can be injected through a syringe, or poured from a bottle into a medicine cup, or drawn up into a syringe or medicine dropper, or squeezed from a dropper bottle into the eye or ear, or atomized into the nasal cavities. In addition to the compatibility with pharmaceutical administration devices and with the mode of introduction into the body, it is often desirable for the composition to easily spread after application without the aid of manual action or devices. The eye drop compositions, for example, need to spread over the surface of the eye, as do swallowed liquids intended to coat the throat, esophagus, or stomach. This is similarly true of rectal enemas or vaginal douche compositions.

In many cases, however, pharmaceutical dosage forms in form of pourable liquids are not necessarily desirable since once administered, such pourable liquids are easily removed from the intended treatment site. In such circumstances the therapeutic advantage of the composition may be significantly diminished or even lost completely. It is appropriate, therefore, to surmise that for the purpose of being retained at the targeted site, it may be desirable for a particular pharmaceutical composition to be more viscous, even in the form of a gel that is not readily flowable. It is, however, difficult or even impossible to administer such a viscous composition to its intended site to do the most good. For example, serious injury could occur when attempting to spread a gel on the surface of one's eye using a finger or more elaborate applicators. More problematic is coating the stomach lining, as this site is simply not accessible using simple self-administer applicators.

There is, therefore, a need for pharmaceutical compositions that are "smart"; that is, capable of being administered in a pourable liquid that are converted or transformed after administration into a vehicle having sufficient viscosity to essentially remain at the targeted site. Such compositions require a built-in chemical or physical triggering mechanism(s) that respond to conditions after application in or on a surface including the body.

BACKGROUND OF THE INVENTION

Attempts to develop such compositions have been ongoing for a significant period of time. Examples of such compositions include intra-ocular dosage forms as disclosed in Edsman, K., Carlfors, J., Petersson, R., Rheological Evaluation of Poloxamer as an In Situ Gel for Ophthalmic Use, European Journal of Pharmaceutics Vol. 6 pp.105-112 (1998) herein incorporated by reference. Compositions such as these are broadly described as primarily

aqueous solutions of block co-polymer surfactants, other wise referred to as "poloxamers", that are commonly known in the art. When formulated in water as somewhat concentrated solutions, or with water and co-solvents, the poloxamer solution remains as a pourable liquid. The most commonly reported example of this type of system consists of poloxamer 407 at concentrations ranging from about 10% to 35% by weight of the composition in water. These compositions are administered at room temperature as liquids. They form a gel upon reaching body temperature. The trigger for converting these compositions to a gel, therefore, is body heat.

In situ gelation of pharmaceutical compositions based on poloxamer that are biologically triggered are known in the art. For example Kim, C.K., Lee, S.W., Choi, H.G., Lee, M.K., Gao, Z.G., Kim, I.S., and Park, K.M.: Trials of In Situ Gelling and Mucoadhesive Acetaminophen Liquid Suppository in Human Subjects, International Journal of Pharmaceutics vol. 174, pp. 201-207 (1998) incorporated herein by reference. Kim et al. discloses liquid suppositories for enhancing absorption of the pain and fever relieving drug acetaminophen.

U.S. Patent 5,256,396, issued October 26, 1993, to Colgate Palmolive Company, incorporated herein by reference, describes similar compositions containing poloxamer 407 and water at specified concentrations. Other products utilizing bio-triggers include those comprising poloxamer 407 at ranges preferably 12% to 17%. When combined with pharmaceutically active agents, these compositions are injected into the gingival space between the root of a tooth and the gum.

Poloxamers represent a large family of polymers that vary in molecular weight as well as in the percentage or portion of the block copolymer that is considered hydrophobic. Compositions comprising other poloxamers from this family having similar liquid/gelling characteristics are somewhat predictable, lacking only in the understanding of the required concentration of poloxamer. While there is a large number of uses for such compositions, they all rely on the same general mechanism of temperature-induced gelation of aqueous poloxamer dispersions. Compositions known in the art are found to be inadequate, however, as the gel structure readily dissolves in aqueous environments.

SUMMARY OF THE INVENTION

The present invention covers pourable liquid vehicles used to deliver compositions, materials and substances to moistened surfaces and aqueous. The benefits of compositions formulated with such pourable liquid vehicles include retention of the compositions, materials and substances on the moistened surface. This in turn allow for effective delivery of a desired compositions, materials and substances in the vehicle that acts on targeted surface, resisting

erosion or run-off even in an aqueous environment. Such pourable liquid vehicles have a number of utilities for delivery of all kinds of materials including but not limited to cleaning and treating surfaces of objects as well as biological or living organisms, including living creatures.

Another object of this invention is to utilize such pourable liquid vehicles to deliver health care compositions and materials and substances to living creatures, particularly mammals, and most particularly humans. Even another object of the present invention is to develop a method for effective delivery of health care compositions, materials and substances.

DETAILED DESCRIPTION OF THE INVENTION

Definitions

Terms useful herein are defined below. Additionally, terms used in the art, as well as general concepts, are further described in Schramm, The Language of Colloid and Interface Science, American Chemical Society, (1993), incorporated herein by reference.

The term "pourable liquid" as used herein means the physical state of the compositions of the present invention prior to formation of a gel.

The term "moistened surface" as used herein means any living or non-living surface having sufficient moisture in or on it to trigger rapid conversion of a pourable liquid to a gel.

The term "in situ gelation" as used herein means the conversion of a pourable liquid to a gel at a designated site or surface.

As used herein, the term "gel" describes the substance resulting from the combination of the pourable liquid and water, or bodily fluid containing mostly water. The gel is sufficiently viscous to remain at the site applied to, or ultimately targeted for, over a period of time sufficient for the compositions, materials and substances in the gel to bring about a desired result at the site they are delivered to.

The term "triggering device" as used herein means an stimulus external to the composition that induces the conversion of a pourable liquid to a gel.

The term "shear" as used herein is the rate of deformation of a fluid when subjected to a mechanical shearing stress. In simple fluid shear, successive layers of fluid move relative to each other such that the displacement of any one layer is proportional to its distance from a reference layer. The relative displacement of any two layers divided by their distance of separation from each other is termed the "shear" or the "shear strain". The rate of change with time of the shear is termed the "shear rate".

A certain applied force is needed to produce deformation in a fluid. For a plane area around some point in the fluid and in the limit of decreasing area the component of deforming forces per unit area that acts parallel to the plane is the "shear stress".

The "viscosity" of a viscous material, also called viscosity index, is defined as the ratio of the shear stress applied into the material, divided by the rate of shear which results. Materials of a higher viscosity have a higher resistance to flow, or to forces which can induce flow, than a lower viscosity material. All viscosities listed herein are at a shear rate of about 50 per second unless otherwise indicated. All of the rheologic characteristics given herein can be measured in a controlled rate or a controlled stress rotational viscometer capable of some operation in a controlled rate mode, for Example Haake RS 150 by Haake GmbH, Karlsruhe, Germany; Carrimed CSL 500 Controlled Stress Rheometer by TA Instruments, New Castle, Delaware; and Rheometric SR5, by Rheometric Scientific, Piscataway, NJ.

Specifically, when subject to constant shearing rate of about 50 per second at normal ambient temperature (approx. 25°C), the present liquid compositions have a viscosity of less than about 7 pascal seconds, preferably less than about 2 pascal seconds, more preferably less than about 1 pascal seconds.

The value of a composition's triggered viscosity ratio ("T") is useful in determining the degree to which a composition exhibits the above described gelling characteristic. The formula and procedure for determining the triggered viscosity ratio is set forth below.

It is desirable for the compositions of the present invention to exhibit a triggered viscosity ratio of at least about 1.3, preferably at least about 2, more preferably at least about 5, and most preferably at least about 10 wherein the triggered viscosity is defined by the following formula or ratio:

$$T = \eta_g / \eta_f$$

where η_g = viscosity of the gel and

where η_f = viscosity of the pourable liquid

The pourable liquid vehicle of the present invention must be selected and formulated so that the contacting and mixing said vehicles to a mucosal surface of the body, or with some other fluid in the body, triggers the conversion of the pourable liquid vehicle to a more viscous gel-like mixture. Examples of these fluids are saliva, gastric fluid, intestinal fluid, extracellular fluid present under the skin at the site of a subcutaneous injection, or in muscle tissue at the site of an intramuscular injection, cerebrospinal fluid, vaginal fluid, fluid exudate from an open wound or ulcer, tear fluid, rectal fluid, or any other bodily fluid of an animal which contains in large

measure water. In other words, after the pourable liquid vehicle contacts with the bodily fluid, the viscosity of the pourable liquid vehicle becomes greater than the viscosity of either the pourable liquid vehicle itself prior to mixing, or the bodily fluid alone.

The triggered viscosity ratio of a pourable liquid vehicle can be determined by one skilled in the art using appropriate viscosity measuring instruments, and is exemplified by the following method. First, the viscosity of the pourable liquid vehicle (η_f) is determined in a rheometer using a shear rate of 50 per second at 25°C. For the determination of η_f, 1 ml of the pourable liquid vehicle is placed onto the plate of a Haake RS150 rheometer. The temperature is controlled in the range of typical room temperature, about 25°C. A cover is used on the measuring system and a solvent-saturated atmosphere provided to prevent evaporation of water, ethanol, or other volatile components from the sample during the test. A 35 mm diameter parallel plate measuring system is lowered onto the sample, leaving a gap of about 1 millimeter, and an equilibration shearing of approximately 10 per second is applied for 10 seconds. Then, a constant shearing rate of 50 per second is applied for 30 seconds. The viscosity η_f is read from the instrument at the 30 second time point.

For the determination of η_g, two dilutions of the pourable liquid vehicle are made with water. The first dilution is made to contain 75% by weight of the pourable liquid vehicle, and 25% by weight of additional water. The second dilution is made to contain 50% by weight of pourable liquid vehicle and 50% by weight of additional water. The pourable liquid vehicle and water are combined in a vial and a tight seal applied to prevent evaporation of components. The vial contents are mixed in an unusual manner, by repeated centrifugation. This is necessary since some of the combinations are very viscous gels. Specifically, the vials are centrifuged (using for example a Beckman GS-6R centrifuge, available from Beckman Instruments, Palo Alto, CA) 20 minutes at 3000 RPM and 25°C for at least four separate centrifuge runs. After each run the vials are inverted. Additional runs are conducted in the centrifuge to ensure complete mixing. 1 ml of the gelled sample is then loaded onto the plate of the same rheometer used for the measurement of η_f, except that the temperature is controlled at the normal body temperature of a human, 37°C. An identical rheometer measurement program is used as for determination of η_f. The triggered viscosity factor for both the 25% and 50% dilution of the sample is calculated from η_f and η_g as described by the formula above. These two dilutions have been found to be useful for measuring the gelling functionality of the pourable liquid vehicles of the invention in a standardize method, because some of the pourable liquid vehicles may require a greater or lesser amount of water in order to trigger the gelling character. The use of other water dilutions for determination of η_g ,

ranging from about 5% up to about 70%, would also be expected to provide a demonstration of the unique, gelling character of the invention, but the diluiton which yields a maximal value of T varies depending upon the exact pourable liquid vehicle being tested.

All percentages of the components comprising the invention are herein refer to the their weight in of the pourable liquid vehicle as a whole.

The present invention is a pourable liquid vehicle comprising:

(a) from about 26% to about 100% polyoxyalkylene block copolymer;

(b) from about 0% to about 70% glycol; and

(c) from about 0% to about 50% water;

wherein said vehicle is used to deliver compositions, materials and substances to moistened surfaces and aqueous environments said vehicle has a viscosity value η_f less than or equal to 7 pascal-seconds and the value T greater than or equal to about 1.3.

Polyoxyalkylene Block Copolymer

Polyoxyalkylene block copolymer herein referred to as "poloxamers" are nonionic block copolymers of ethylene oxide and propylene oxide corresponding to the following structure:

$$HO-(CH_2CH_2O)_x-(CH(CH_3)CH_2O)_y-(CH_2CH_2O)_x-H$$

wherein x, y, and x' have a value wherein said vehicle has a viscosity value η_f less than or equal to 7 pascal-seconds and the value T greater than or equal to about 1.3. Preferable polyoxyalkylene block copolymers useful in the present invention include wherein x has a value from about 1 to about 130, y has a value from about 1 to about 72 and x' has a value from about 0 to about 130, wherein the average molecular weight of said copolymer is from about 3000 to about 15,000. More preferred is where x equals 37, y equals 58 and x' equals 37 and has a average molecular weight of 6500. Most preferred is wherein x equals 100, y equals 70 and x' equals 100 and has an average molecular weight of about 12,600;

The poly(oxyethylene) segment is hydrophilic and the poly(oxypropylene) segment is hydrophobic. The level of the poloxamers useful in the present invention ranges from about 26% to about 100%, preferably from about 27.8% to about 95%, more preferably 30% to about 90% by weight of the pourable liquid vehicle. In other words, providing the poloxamer has the critical viscosities above, it can be used itself or when combined with other compositions, materials and substances.

A family of poloxamers are available and vary in the number of blocks, the overall average molecular weight, and in the percentage of the molecule which is hydrophilic. A block

refers to a single polyoxyethylene or polyoxypropylene segment. Di-block and tri-block polymers have been described. In the case of tri-block copolymers, the blocks can be arranged in the format of one polyoxypropylene block surrounded by 2 polyoxyethylene blocks, that being the most common poloxamer structure, or alternatively as one polyoxyethylene block surrounded by 2 polyoxypropylene blocks, the latter sometimes referred to as a reverse poloxamer. Poloxamers are available under the trade names of Lutrol, Monolan, or Pluronic. The chemical structure, synthesis, and properties have been described [(poly(ethylene oxide)/poly(propylene oxide)] block copolymer surfactants, Paschalis Alexandridis, Current Opinions in Colloid and Interface Science, Vol 2, pp. 478-489 (1997) herein incorporated by reference.

For applications in the health care area, compositions embodying the present invention utilize a specific group of pharmaceutically acceptable block copolymers or poloxamers. These poloxamers are selected from the group consisting of Pluronic F127, P105, F108 and mixtures thereof, all available from BASF Corp.

Glycols

In addition to the poloxamers, it is desirable in some of the pourable liquid vehicles of the present invention to combine glycols with the poloxamers for controlling the viscosity of the pourable liquid vehicles. These glycols permit the pourable liquid vehicle to remain pourable while containing very high levels of the poloxamer so that administration is convenient, or so that the composition can readily pass through the bore of a syringe or other dosing apparatus. Additionally, these glycols provide solvent capacity for pharmaceutical actives or other composition components. The level of glycols in the present invention is from about 0% to about 70%, preferably from about from about 10% to about 70% and most preferably from about 7% to about 62% of the pourable liquid vehicle.

Glycols are low molecular weight mono- and polyols and are selected from the group consisting of monosaccharides such as glucose (dextrose), fructose (levulose); disaccharides such as sucrose, lactose, maltose, cellobiose and other sugars, ribose, glycerin, sorbitol, xylitol, inositol, propylene glycol, galactose, mannose, xylose, rhamnose, glutaraldehyde, invert sugars, ethanol, honey, mannitol, polyethylene glycol, glycerol, and mixtures thereof. Preferred glycolsare selected from the group consisting of ethanol, glycerol and propylene glycol, and mixtures thereof. Absolute ethanol is available from Aaper Alcohol & Chemical Co., Shelbyville, KY

Water

In addition to the poloxamers, and, or the glycol, it is desirable in some of the pourable liquid vehicles of the present invention to include water. Water is useful at a level from about

0% to about 50%, preferably about 1% to about 46%, most preferably from about 2% to about 41% of the pourable liquid vehicle.

Preferred Embodiments

Preferred embodiments of the present invention utilizing the combination of poloxamers, polyols and water include the following:

1. from about 26% to about 65% Pluronic F127, from about 22% to about 38% ethanol and from about 8% to about 45% water.
2. from about 52% to about 60% Pluronic F108, from about 20% to about 25% ethanol and from about 17% to about 27% water.
3. from about 25% to about 50% Pluronic P105, from about 45% to about 65% propylene glycol and from about 5% to about 20% water.
4. from about 37% to about 77% Pluronic P105, from about 12% to about 28% ethanol, and from about 10% to about 45% water
5. from about 26% to about 49% Pluronic F127, from about 2% to about 12% ethanol, from about 30% to about 68% propylene glycol, and from about about 7% to about 40% water.

Materials to be Delivered

As previously stated, the pourable liquid vehicles of the present invention are useful as delivery vehicles for desired compositions, materials and substances that may be dispersed into them. This could range from compositions, materials and substances that are desired to remain on an applied surface for a period of time to deliver a benefit. Examples include antimicrobials for cleansing surfaces including sinks, toilets and shower tile; to body wounds; oral treatment of gingival and buccal tissues as well as teeth surfaces; agricultural uses including elimination of undesirable plants, animals, viruses, bacteria insects, and the like.

The present invention is particularly useful for delivery health care compositions, materials and substances. These materials can range from dietary compositions to promote nutrition or weight loss to pharmacologically effective amount of a agents selected from the group consisting of antibacterial substances, antihistamines, antitussives, anti-inflammatories, expectorants/mucolytics, mast cell stabilizers, leukotriene antagonists, methylxanthines, antioxidants, steroids, bronchodilators, antivirals, biologics, analgesics, anesthetics, antiarthritics, antiasthmatics, urinary tract disinfectives, anticoagulants, anticonvulsants, antidepressants, antidiabetics, antineoplastics, antipsychotics, antihypertensives, muscle relaxants, antiprotozoals, and mixtures thereof.

Preferred embodiment of the present invention relates to compositions including pharmaceutically acceptable polyoxyalkylene block copolymer and glycols in combination with a pharmacologically active agent. Suitable classes of agents that can be administered by embodiments of the present invention include:

Antibacterial substances such as β-lactum antibiotics, such as cefoxitin, n-formamidoyl thienamycin and other thienamycin derivatives, tetracyclines, chloramphenicol, neomycin, gramicidin, bacitracin, sulfonamides; aminoglycoside antibiotics such as gentamycin, kanaranycin, amikacin, sisomicin and tobramycin; nalidixic acids and analogs such as norfloxacin and the antimicrobial combination of fluoroalanine/pentizidone; nitrofurazones, and mixtures thereof.

Antihistamines, including, Hydroxyzine, Pyrilamine, Phenindamine, Dexchlorpheniramine, Clemastine Diphenhydramine, Azelastine, Acrivastine, Levocarbastine, Mequitazine, Astemizole, Ebastine, Loratadine, Cetirizine, Terfenadine, Promethazine, Dimenhydrinate, Meclizine, Tripelennamine, Carbinoxamine, Cyproheptadine, Azatadine, Brompheniramine, Triprolidine, Cyclizine, Thonzylamine, Pheniramine, and mixtures thereof.

Antitussives, including, Hydrocodone, Noscapine, Benzonatate, Diphenhydramine, Chlophedianol, Clobutinol, Fominoben, Glaucine, Pholcodine, Zipeprol, Hydromorphone, Carbetapentane, Caramiphen, Levopropoxyphene, Codeine, Dextromethorphan, and mixtures thereof.

Antiinflammatories, preferably Non-Steroidal Anti-inflammatories (NSAIDS) including, Ketoprofen, Indoprofen, Indomethacin, Sulindac, Diflunisal, Ketorolac, Piroxicam, Meclofenamate, Benzydamine, Carprofen, Diclofenac, Etodolac, Fenbufen, Fenoprofen, Flurbiprofen, Mefenamic, Nabumetone, Phenylbutazone, Pirprofen, Tolmetin, Ibuprofen, Naproxen, Sodium naproxen, Aspirin, and mixtures thereof.

Expectorants/Mucolytics, including, Ambroxol, Bromhexine, Terpin, Guaifenesin, Potassium iodide, N-Acetylcysteine, and mixtures thereof.

Mast Cell Stabilizers, preferably intranasally, or orally administered mast cell stabilizers, including, Cromolyn, Oxatamide, Ketotifen, Lodoxamide, Nedocromil, and mixtures thereof.

Leukotriene Antagonists, including, Zileuton and others.

Methylxanthines, including, Caffeine, Theophylline, Enprofylline, Pentoxifylline, Aminophylline, Dyphylline, and mixtures thereof.

Antioxidants or radical inhibitors, including, Ascorbic acid, Tocopherol, Pycnogenol, and mixtures thereof.

Steroids, preferably intranasally administered steroids, including, Beclomethasone, Fluticasone, Budesonide, Mometasone, Triamcinolone, Dexamethasone, Flunisolide, Prednisone, Hydrocortisone and mixtures thereof.

Bronchodilators, preferably for inhalation, including, Albuterol, Epinephrine, Ephedrine, Metaproterenol, Terbutaline, Isoetharine, Terbutaline, Isoetharine, Pirbuterol, Bitolterol, Fenoterol, Rimeterol, Ipratroprium, and mixtures thereof.

Antivirals, including, Amantadine, Rimantadine, Enviroxime, Nonoxinols, Acyclovir, Alpha-Interferon, Beta-Interferon, and mixtures thereof.

Biologics, including, cytokine and celladhesion molecule inhibitors, ICAM antagonists, interleukin agonists or antagonists, hormones, polypeptides, amino acids, nucleotides, antibodies, and mixtures thereof.

Analgesics such as aspirin, acetaminophen, diflunisal, and mixtures thereof.

Anesthetics such as lidocaine, procaine, benzocaine, xylocaine, and mixtures thereof.

Antiarthritics such as phenylbutazone, indomethacin, sulindac, dexamethasone, ibuprofen, allopurinol, oxyphenbutazone, probenecid, and mixtures thereof.

Antiasthma drugs such as theophylline, ephedrine, beclomethasone dipropionate, epinephrine, and mixtures thereof.

Urinary tract disinfectives such as sulfamethoxazole, trimethoprim, nitrofurantoin, norfloxacin, and mixtures thereof.

Anticoagulants such as heparin, bishydroxycoumarin, warfarin, and mixtures thereof.

Anticonvulsants such as diphenylhydantoin, diazepam, and mixtures thereof.

Antidepressants such as amitriptyline, chlordiazepoxide, perphenazine, protriptyline, imipramine, doxepin, and mixtures thereof.

Antidiabetics such as insulin, tolbutamide, tolazamide, acetohexamide, chlorpropamide, and mixtures thereof.

Antineoplastics such as adriamycin, fluorouracil, methotrexate, asparaginase, and mixtures thereof.

Antipsychotics such as prochlorperazine, lithium carbonate, lithium citrate, thioridazine, molindone, fluphenazine, trfluoperazine, perphenazine, amitriptyline, triflupromazine, and mixtures thereof.

Antihypertensive such as spironolactone, methyldopa, hydralazine, clonidine, chlorothiazide, deserpidine, timolol, propranolol, metoprolol, prazosin hydrochloride, reserpine, and mixtures thereof.

Muscle relaxants such as melphalan, dantrolene, cyclobenzaprine, methocarbamol, diazepam, and mixtures thereof.

Antiprotozoals such as chloramphenicol, chloroquine, trimethoprim, sulfamethoxazole, and mixtures thereof.

For treatment of vaginal and urethral conditions requiring antifungal, amoebicidal, trichomonoacidal agents or antiprotozoals, the following agents can be used: polyoxyethylene nonylphenol, alkylaryl sulfonate, oxyquinoline sulfate, miconazole nitrate, sulfanilamide, candicidin, sulfisoxazole, nystatin, clotrimazole, metronidazole and mixtures thereof; antiprotozoals such as chloramphenicol, chloroquine, trimethoprim, sulfamethoxazole and mixtures thereof; antiviral effective compounds such as acyclovir and interferon. Spermicidals can be used such as nonoxynal.

EXAMPLES

Example I: Composition for the treatment of cough

Component	**% (w/w)**
Dextromethorphan Base	1.47
Vehicle[1]	98.18
Sodium Saccharin	0.3
Monoammonium Glycerizinate	0.05
Flavors and Colors	Flavors and Colors

1. Vehicle contains (w/w%):

Pluronic F127	55.51% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	26.48%
Water	18.01%

Preparation:

Add the dextromethorphan base, sodium saccharin, and monoammonium glycerizinate into a clean vessel. Add ethanol and then the poloxamer and water. Mix until clear and uniform.

Example II: Composition for the treatment of cough and decongestion

Component	**% (w/w)**
Dextromethorphan Base	1.47
Chlorophenarimine Maleate	0.26
Vehicle[1]	97.92

Sodium Saccharin	0.3
Monoammonium Glyzeriziinate	0.05
Flavors and Colors	As Desired

1. Vehicle contains (w/w%):

Pluronic F127	55.66% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	26.55%
Water	17.79%

Preparation:

Mill and screen the chlorophenarimine maleate to reduce the product particle size. Add the chlorophenarimine maleate, dextromethorphan base, sodium saccharin, and monoammonium glycerizinate into a clean vessel. Add ethanol to the vessel. Subsequently, add poloxamer and water to the vessel. Mix until the suspension is uniform.

Example III: Demulcent composition for the treatment of sore throat.

Component	**% (w/w)**
Vehicle[1]	96.845
Menthol	1.00
Benzocaine	2.00
Eucalyptus Oil	0.005
Sodium Saccharin	0.10
Monoammonium Glyzeriziinate	0.05
Flavors and Colors	As Desired

1. Vehicle contains (w/w%):

Pluronic F108	56.79% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	21.69%
Water	21.52%

Preparation:

Mill and screen the menthol and benzocaine to reduce the product particle size. Add the menthol, benzocaine, sodium saccharin, and monoammonium glycerizinate into a clean vessel. Add eucalyptus oil, ethanol to the vessel. Subsequently add the poloxamer and water to the vessel. Mix until uniform.

Example IV: Composition for the rectal delivery of acetaminophen.

Component	% (w/w)
Vehicle[1]	95.0
Acetaminophen	5.0

1. Vehicle contains (w/w%):

Pluronic P105	44.21% (BASF Specialty Chemicals, Mount Olive, N.J.)
Propylene Glycol	52.63%
Water	3.16%

Preparation:

Mill and screen the acetaminophen to reduce the particle size. Add the acetaminophen into a clean vessel. Add propylene glycol to the vessel. Subsequently add the poloxamer and water to the vessel. Mix until uniform.

Example V: Composition for the topical delivery of an analgesic.

Component	% (w/w)
Vehicle[1]	98.0
Ketoprofen	2.0
Perfumes	As Desired

1. Vehicle contains (w/w%):

Pluronic F127	56.12% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	30.61%
Water	13.27%

Preparation:

Screen the ketoprofen to reduce the particle size. Add the ketoprofen into a clean vessel. Add ethanol to the vessel. Subsequently add poloxamer and water to the vessel. Mix until uniform.

Example VI: Composition for the topical delivery of an analgesic

Component	% (w/w)
Vehicle[1]	95.0
Ibuprofen	5.0
Perfumes	As Desired

1. Vehicle contains (w/w%):

Pluronic P105	63.16% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	18.95%
Water	17.89%

Preparation:

Screen the ibuprofen to reduce the particle size. Add the ibuprofen into a clean vessel. Add ethanol to the vessel. Subsequently add the poloxamer and water to the vessel. Mix until uniform.

Example VII: Composition for the delivery of an oral antimicrobial

Component	% (w/w)
Vehicle[1]	98.57
Triclosan Monophosphate	0.28
Menthol	1.00
Sodium Saccharin	0.10
Monoammonium Glyzeriziinate	0.05
Flavors and Colors	As Desired

1. Vehicle contains (w/w%):

Pluronic F108	55.80% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	21.30%
Water	22.90%

Preparation:

Mill and screen the menthol and triclosan monophosphate to reduce particle size. Add the menthol, triclosan monophophate, sodium saccharin, and monoammonium glycerizinate into a clean vessel. Add propylene glycol to the vessel. Subsequently add the poloxamer and water to the vessel. Mix until uniform.

Example VIII: Composition for the intranasal delivery of a decongestant

Component	% (w/w)
Vehicle[1]	99.32
Oxymetazoline HCl	0.05
Tyloxapol	0.15

Dibasic Sodium Phosphate	0.04
Monobasic Potassium Phosphate	0.13
Benzalkonium Chloride	0.04
Chlorhexidine Gluconate	0.26
Disodium EDTA	0.01

1. Vehicle contains (w/w%):

Pluronic F127	40.27% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	26.18%
Water	33.55%

Preparation:

Add the dibasic sodium phosphate, monobasic potassium phosphate, disodium EDTA, benzalkonium chloride and oxymetazoline HCl into a clean vessel. Add tyloxapol, chlorhexidine gluconate, and ethanol to the vessel. Subsequently add, the poloxamer and water to the vessel. Mix until uniform.

Example X: Composition to vaginally deliver hormonal replacement therapy

Component	**% (w/w)**
Vehicle[1]	99.99
Beta Estradiol	0.01
Perfumes	As desired

1. Vehicle contains (w/w%):

Pluronic P105	45.00% (BASF Specialty Chemicals, Mount Olive, N.J.)
Propylene glycol	48.00%
Water	7.00%

Preparation:

Add the beta estradiol and propylene glycol into a clean vessel. Subsequently add the poloxamer and water to the vessel. Mix until uniform.

Example XI: Composition for the rectal delivery of an antiemetic

Component	**% (w/w)**
Vehicle[1]	99.75
Promethazine HCl	0.25

1. Vehicle contains 100.0% (w/w%) Pluronic L62 (BASF Specialty Chemicals, Mount Olive, N.J.)

Preparation:

Mill and screen the promethazine HCl to reduce particle size. Add the poloxamer and the Promethazine HCl into a clean vessel. Mix until uniform.

Example XII: Composition for the rectal delivery of an antiemetic

Component	% (w/w)
Vehicle[1]	98.75
Carbomer [2]	1.00
Promethazine HCl	0.25

1. Vehicle contains 100.0% (w/w%) Pluronic L62 (BASF Specialty Chemicals, Mount Olive, N.J.)
2. Carbopol 974 available from B. F. Goodrich Company, Brecksville. Ohio

Preparation:

Mill the promethazine HCl to reduce particle size. Sieve the carbomer and promethazine HCl and add to a clean vessel. Add the poloxamer. Mix until uniform.

Example XIII: Composition for the Treatment of Cough

Component	% (w/w)
Dextromethorphan Base	2.20
Vehicle[1]	95.15
Sodium Metabisulfite	0.10
Disodium EDTA	0.10
Sodium Saccharin	0.40
Monoammonium Glyzeriziinate	0.15
Acesulfame	0.50
Flavor	1.40

1. Vehicle contains (w/w%):

Pluronic F127	33.56% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	10.51%
Water	13.42%
Propylene glycol	42.51%

Preparation:

Add propylene glycol and poloxamer to a clean vessel (main mix). While stirring, heat the mixture as appropriate to sufficiently melt the poloxamer. Once a uniform solution is obtained remove from heat source and continue mixing. In a separate vessel (alcohol pre-mix) add alcohol, dextromethorphan base and monoammonium glyzeriziinate and mix until uniform. In another vessel (water pre-mix), add water, EDTA , sodium saccharin, acesulfame and sodium metabisulfite. Mix until all materials are dissolved.

Add the alcohol containing premix to the main mixing vessel containing the poloxamer. Mix until uniform. While stirring, add the water containing premix to the main vessel and continue to mix until uniform. Subsequently, add desired flavor component and mix until uniform.

The preparation has a viscosity (η_f)of 0.67 Pascal seconds and a triggered viscosity ratio at a 50% dilution with water of 10.5

Example XIV: Composition for the Treatment of Cough

Component	**% (w/w)**
Dextromethorphan Base	2.20
Vehicle[1]	95.15
Sodium Metabisulfite	0.10
Disodium EDTA	0.10
Sodium Saccharin	0.40
Monoammonium Glyzeriziinate	0.15
Acesulfame	0.50
Flavor	1.40

1. Vehicle contains (w/w%):

Pluronic F127	29.08% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	10.51%
Water	24.61%
Propylene glycol	35.80%

Preparation:

Add propylene glycol and poloxamer to a clean vessel (main mix). While stirring, heat the mixture as appropriate to sufficiently melt the poloxamer. Once a uniform solution is obtained remove from heat source and continue mixing. In a separate vessel (alcohol pre-mix) add alcohol, dextromethorphan base and monoammonium glyzeriziinate and mix until uniform. In another vessel (water pre-mix), add water, EDTA , sodium saccharin, acesulfame and sodium metabisulfite. Mix until all materials are dissolved.

Add the alcohol containing premix to the main mixing vessel containing the poloxamer. Mix until uniform. While stirring, add the water containing premix to the main vessel and continue to mix until uniform. Subsequently, add desired flavor component and mix until uniform.

The proportions of poloxamer : glycol : water in the preparation is 29.08 : 46.31 : 24.61

The preparation has a viscosity (η_f)of 0.97 Pascal seconds and a triggered viscosity ratio at a 50% dilution with water of 4.95.

Example XV: Composition for the Treatment of Cough

Component	**% (w/w)**
Dextromethorphan Base	2.20
Vehicle[1]	95.15
Sodium Metabisulfite	0.10
Disodium EDTA	0.10
Sodium Saccharin	0.40
Monoammonium Glyzeriziinate	0.15
Acesulfame	0.50
Flavor	1.40

1. Vehicle contains (w/w%):

Pluronic F127	40.27% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	10.51%
Water	13.42%
Propylene glycol	35.80%

Preparation:

Add propylene glycol and poloxamer to a clean vessel (main mix). While stirring, heat the mixture as appropriate to sufficiently melt the poloxamer. Once a uniform solution is obtained remove from heat source and continue mixing. In a separate vessel (alcohol pre-mix) add alcohol, dextromethorphan base and monoammonium glyzeriziinate and mix until uniform. In another vessel (water pre-mix), add water, EDTA , sodium saccharin, acesulfame and sodium metabisulfite. Mix until all materials are dissolved.

Add the alcohol containing premix to the main mixing vessel containing the poloxamer. Mix until uniform. While stirring, add the water containing premix to the main vessel and continue to mix until uniform. Subsequently, add desired flavor component and mix until uniform.

The proportions of poloxamer : glycol : water in the preparation is 40.27 : 46.31 : 13.42

The preparation has a viscosity (η_f)of 2.14 Pascal seconds and a triggered viscosity ratio at a 50% dilution with water of 6.05.

Example XVI: Composition for the Treatment of Cough

Component	**% (w/w)**
Dextromethorphan Base	2.20
Vehicle[1]	97.8
Flavors	As desired

1. Vehicle contains (w/w%):

Pluraflo 1220	40.90% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	10.22%
Propylene Glycol	46.83%
Anhydrous glycerine	2.05

Preparation:

Weigh the dextromethorphan into a clean vessel, add the ethanol and begin mixing. Add propylene glycol and mix until uniform and clear. Add Pluraflo and mix. Add Glyerine and mix until uniform.

Add propylene glycol and Pluraflo to a clean vessel (main mix). Stir. heat the mixture as appropriate to sufficiently melt the poloxamer. Once a uniform solution is obtained remove from heat source and continue mixing. In a separate vessel (alcohol pre-mix) add alcohol, dextromethorphan base and monoammonium glyzeriziinate and mix until uniform. In another

vessel (water pre-mix), add water, EDTA , sodium saccharin, acesulfame and sodium metabisulfite. Mix until all materials are dissolved.

Add the alcohol containing premix to the main mixing vessel containing the poloxamer. Mix until uniform. While stirring, add the water containing premix to the main vessel and continue to mix until uniform. Subsequently, add desired flavor component and mix until uniform.

The proportions of poloxamer : glycol : water in the preparation is 29.08 : 46.31 : 24.61

Example XVII : Composition for the Treatment of Otitis

Component	**% (w/w)**
ofloxacin	0.30
Vehicle[1]	98.95
Perfume	0.75

1. Vehicle contains (w/w%):

Pluraflo 1220	45.48% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	5.05%
Propylene Glycol	41.23%
Anhydrous glycerine	8.24

Preparation:

Add propylene glycol, Pluraflo, glycerine and ethanol to a clean vessel. While stirring, add ofloxacin. Stir unit a clear solution is obtained. Subsequently, add perfume and mix until uniform.

Example XVIII : Composition for the Treatment of Glaucoma

Component	**% (w/w)**
Timolol maleate	0.25
Vehicle[1]	99.75

1. Vehicle contains (w/w%):

Pluraflo 1220	92.73% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	2.11%
Anhydrous glycerine	5.16

Preparation:

Add glycerine, ethanol and Pluraflo to a clean vessel. Add Timolol. Cover tightly and stir until a clear solution is obtained.

Example XIX : Composition for the Treatment of Ulcers

Component	**% (w/w)**
Omeprazole (Free Base)	2.00
Vehicle[1]	95.89
Sodium Metabisulfite	0.10
Disodium EDTA	0.10
Sodium Saccharin	0.25
Monoammonium Glyzeriziinate	0.11
Acesulfame	0.35
Flavor	1.20

1. Vehicle contains (w/w%):

Pluronic F127	34.07% (BASF Specialty Chemicals, Mount Olive, N.J.)
Ethanol	10.43%
Water	13.32%
Propylene glycol	42.18%

Preparation:

Add propylene glycol and poloxamer to a clean vessel (main mix). While stirring, heat the mixture as appropriate to sufficiently melt the poloxamer. Once a uniform solution is obtained remove from heat source and continue mixing. In a separate vessel (alcohol pre-mix) add alcohol, omeprazole base and monoammonium glyzeriziinate and mix until uniform. In another vessel (water pre-mix), add water, EDTA , sodium saccharin, acesulfame and sodium metabisulfite. Mix until all materials are dissolved.

Add the alcohol containing premix to the main mixing vessel containing the poloxamer. Mix until uniform. While stirring, add the water containing premix to the main vessel and continue to mix until uniform. Subsequently, add desired flavor component and mix until uniform.

Example XX: Composition for the Controlled Release of an Appetite Suppressant

Component	% (w/w)
Phenylpropanolamine	3.3
Vehicle[1]	96.5
Sodium Metabisulfite	0.10
Disodium EDTA	0.10

1. Vehicle contains (w/w%):

Pluraflo 1220	70.12% (BASF Specialty Chemicals, Mount Olive, N.J.)
Propylene glycol	11.27
Ethanol	2.26%
Anhydrous glycerine	16.35

Preparation:

Add alcohol, propylene glycol, and phenylpropanolamine to a clean vessel and begin mixing. Subsequently, add, Pluraflo and glycerol to the vessel. Mix until uniform. This liquid may be filled into hard gelatin capsules which are then banded to prevent leakage, or it may be used as the fill for a soft elastic gelatin capsule.

One capsule is made to contain 0.75 ml of the liquid, and taken 3 times daily provides controlled release of the phenylpropanolamine active. After swallowing, the gelatin shell dissolves in the gastrointestinal tract and the liquid fill immediately transforms in to a slow dissolving gel which provides controlled release of the phenylpropanolamine.

Example XXI: Composition for the injection of an Analgesic

Per one 1.0mL injection

Component	% (w/w)
Morphine Sulfate	1.0
Vehicle[1]	99.0

1. Vehicle contains (w/w%):

Pluraflo 1220	52.63% (BASF Specialty Chemicals, Mount Olive, N.J.)
Propylene glycol	35.79%
Ethanol	3.16%

Anhydrous glycerine 8.42%

Preparation:

Add propylene glycol, ethanol, glycerine and morphine sulfate into a clean vessel and begin mixing. Subsequently, add poloxamer (Pluraflo) and mix until uniform.

The composition provides pain relief when 1 mL is injected intramuscularly.

What is claimed is:

1. A pourable liquid vehicle comprising:

(d) from about 26% to about 100% polyoxyalkylene block copolymer;

(e) from about 0% to about 70% glycol; and

(f) from about 0% to about 50% water;

wherein said vehicle is used to deliver compositions, materials and substances to moistened surfaces and aqueous environments said vehicle has a viscosity value η_f less than or equal to 7 pascal-seconds and the value T greater than or equal to about 1.3.

2. The pourable liquid vehicle according to Claim 1 wherein the polyoxyalkylene block copolymer corresponds to the following structure:

$$HO\text{—}(CH_2CH_2O)_x\text{-}(\overset{CH_3}{\overset{|}{C}}H_2CHO)_y\text{-}(CH_2CH_2O)_x\text{—}H$$

wherein x, y, and x' have a value wherein said vehicle has a viscosity value η_f less than or equal to 7 pascal-seconds and the value T greater than or equal to about 1.3.

3. The vehicle according to Claim 2 comprising from about from about 27.8% to about 95% of the pharmaceutically acceptable polyoxyalkylene block copolymer wherein said vehicle has a viscosity η_f less than or equal to 2 pascal-seconds and value T is greater than or equal to about 2.

4. The composition according to Claim 2 comprising from about from about 30% to about 90% of the pharmaceutically acceptable polyoxyalkylene block copolymer wherein said vehicle has a viscosity η_f less than or equal to 2 pascal-seconds and value T is greater than or equal to about 5.

5. The composition according to Claim 1 comprising from about 10% to about 70% glycol.

6. The composition according to Claim 5 wherein said glycol is selected from the group consisting of monosaccharides, disaccharides, ribose, glycerin, sorbitol, xylitol, inositol, propylene glycol, galactose, mannose, xylose, rhamnose, glutaraldehyde, invert sugars, ethanol, honey, mannitol, polyethylene glycol, glycerol, and mixtures thereof.

7. The composition according to Claim 1 comprising from about 1% to about 46% water.

8. A pourable liquid vehicle comprising:

(a) from about 26% to about 100% polyoxyalkylene block copolymer;

(b) from about 0% to about 70% glycol; and

(c) from about 0% to about 50% water;

wherein said vehicle is used to deliver pharmaceutically active agents to moistened surfaces and aqueous environments wherein said vehicle has a viscosity value η_f less than or equal to 7 pascal-seconds and the value T greater than or equal to about 1.3.

9. The pourable liquid vehicle according to Claim 8 wherein the polyoxyalkylene block copolymer corresponds to the following structure:

$$HO\text{—}(CH_2CH_2O)_{\bar{x}}\text{-}(\overset{CH_3}{\overset{|}{C}}H_2CHO)_{\bar{y}}\text{--}(CH_2CH_2O)_{\bar{x}}\text{—}H$$

wherein the values of x, y, and x' are sufficient to provide the η_f and T values of claim 8.

10. The vehicle according to Claim 9 comprising from about from about 27.8% to about 95% of the pharmaceutically acceptable polyoxyalkylene block copolymer said vehicle has a viscosity η_f less than or equal to 2 pascal-seconds and value T is greater than or equal to about 2.

11. The vehicle according to Claim 10 comprising from about from about 30% to about 90% of the pharmaceutically acceptable polyoxyalkylene block copolymer wherein said vehicle has a viscosity η_f less than or equal to 2 pascal-seconds and value T is greater than or equal to about 10.

12. The vehicle according to Claim 9 wherein the polyoxyalkylene block copolymer wherein x has a value from about 1 to about 130, y has a value from about 1 to about 72 and x' has a value from about 0 to about 130, wherein the average molecular weight of said copolymer is from about 3000 to about 15,000.

13. The vehicle according to Claim 8 comprising from about 7% to about 62% glycol.

14. The vehicle according to Claim 13 wherein said glycol is selected from the group consisting of monosaccharides, disaccharides, ribose, glycerin, sorbitol, xylitol, inositol, propylene glycol, galactose, mannose, xylose, rhamnose, glutaraldehyde, invert sugars, ethanol, honey, mannitol, polyethylene glycol, glycerol, and mixtures thereof.

15. The vehicle according to Claim 8 comprising from about 2% to about 41% water.

16. The vehicle according to Claim 8 comprising:

(a) from about 26% to about 65% polyoxyalkylene block copolymer having a value x equal to 100, y equal to 70 and x' is equal to 100 and has an average molecular weight of about 12,600;

(b) from about 2% to about 38% ethanol; and

(c) from about 8% to about 45% water.

17. The composition according to Claim 8 comprising:

(a) from about 25% to about 50% polyoxyalkylene block copolymer having a value x equal to 37, y equal to 58 and x' is equal to 37 and has a average molecular weight of 6500;

(b) from about 45% to about 65% propylene glycol; and

(c) from about 5% to about 20% water.

18. The composition according to Claim 8 comprising:

(a) from about 52% to about 60% polyoxyalkylene block copolymer having a value x equal to 128, y equal to 58 and x' is equal to 128 and has an average molecular weight of 14,600;

(b) from about 2% to about 25% ethanol; and

(c) from about 17% to about 27% water.

19. The composition according to Claim 8 comprising:

(a) from about 37% to about 77% polyoxyalkylene block copolymer having a x equal to37, y equal to 58 and x' is equal to 37 and has a average molecular weight of 6500;

(b) from about 2% to about 28% ethanol; and

(c) from about 10% to about 45% water.

20. The composition according to Claim 8 comprising:

(a) from about 26% to about 49% polyoxyalkylene block copolymer having a value x equal to 100, y equal to 70 and x' is equal to 100 and has an average molecular weight of about 12,600;

(b) from about 2% to about 12% ethanol; and

(c) from about 30% to about 68% propylene glycol; and

(d) from about 7% to about 40% water.

21. A method for delivery of pharmacologically active agents to mammals by administering the pourable liquid vehicle of claim 8 to a moistened site on or in said mammal wherein said vehicle has a viscosity η_f less than or equal to 7 pascal-seconds and the value of T greater than or equal to about 1.4.