Introduction:

- Many pharmaceutical chemicals are only slowly soluble in a solvent and require an extended time for complete dissolution. To increase the dissolution rate, a pharmacist may employ one or several techniques such as applying heat, reducing the particle size of the solute, utilizing of a solubilizing agent, or subjecting the ingredients to rigorous agitation.
- The pharmacist should ensure the materials are heat stabile and non-volatile when using heat to facilitate the dissolution rice.
- . Furthermore definitions can vary between different official compendia and may be at variance with definitions used within pharmaceutical industry.

Non- aqueous Solutions:

This section is, therefore, devoted to groups of non- aqueous solutions, the alcoholic or hydro alcoholic solutions (e.g. Collodions), glycerin solutions (e.g. glycerin), oleaginous solutions (e.g. liniments, oleovitamins)

Elixirs:

Elixirs are clear, pleasantly flavored, sweetened hydroalcholic liquids intended for oral use. The main ingredients in elixirs are ethanol and water but glycerin, sorbital, propylene glycol, flavoring agents, preservatives and syrups often are used in the preparation of the final product. Their popularity is due to their pleasant flavor, their relative stability and the ease with which most of them are prepared.

Fig: Elixirs

Advantages:

I. Elixirs are more fluid than syrups.
II. It often is desirable, it is more effective in masking such tastes.
III. Elixirs are more readily prepared and manufatured than syrups.
IV. An elixir may contain both water and alcohol soluble ingredients.

Disadvantages:

I. It is intended for internal use only.
II. If an aqueous solution is added to an elixir, a partical precipitation of alcohol soluble ingredients may occur.

Uses:

I. Elixirs are used as flavors and vehicle such as aromatic elixir USP for drug substances.

II. The solvents are often used to increase the solubility of the drug substances in the dosage form.

Sprits:

Sprits may be defined as solutions of volatile substances in alcohol. It sometimes known as essences is alcoholic or hydro alcoholic solutions of volatile substances. It may be solid, liquid or gas. The amount of volatile material in sprits varies greatly and no fixed percentage can be given. The preparation begins with Brandy and Whisky and ends with with a wide variety of products.

Advantages:

I. Sprits can concentration greater concentration of alcohol than corresponding aromatic water.
II. When mixed with water or with an aqueous preparation the volatile substances present in sprits generally mixed with water or with an aqueous preparation, the volatile substances present in spirits generally separate from solution and form a milky preparation.

Disadvantages:

I. Salts may be precipitated from their aqueous solutions by the addition of spirits due to their lesser solubility in alcoholic liquids.

II. Some spirits show incompabilties characteristic of the ingredients they contain.

Uses:

- Spirits may be used pharmaceutically as flavoring agents and medicinally for the therapeutic value of the aromatic solute. As flavoring agents they are used to impart the flavor of their solute to other solute to other pharmaceutical preparations.

  For medicinal purposes spirits may be taken orally, applied externally, or used by inhalation depending upon the particular preparation.

Collodion:

A highly flammable syrupy liquid compounded of pyroxylin dissolved in ether and alcohol, which dries to a clear tenacious film; used as a topical protectant applied to the skin to close small wounds, abrasions and cuts, to hold surgical dressings in place, and to keep medications in contact with the skin.

Flexible collodion: A preparation of camphor, castor oil, and collodion, used as a topical protectant.

Salicylic acid collodion: flexible collodion containing salicylic acid; used topically as a keratolytic.

Collodion USP
2oz. 60ml Tubes

Uses:

- It is used as an adhesive to close small wounds and hold surgical dressings, in topical medications, and for making photographic plates.

Glycerin:

Glycerin is miscible with both water and alcohol but not with chloroform, ether or fixed oils. It is an excellent solvent for tannins, phenol and boric acid.

Chemically it is the simplest trihydric alcohol. It is worthy of special note because the two terminal alcohol groups are primary, whears the middle one is secondary. Thus this becomes the first polyhydric alcohol that can yield both an aldose (glyceraldehydes) and a ketose (dihydrooxyacetone).

It is a clear, colorless, syrupy liquid with a sweet taste and not more than a slight, characteristic odor, which is neither harsh nor disagreeable, when exposed to moist air it absorbs water and H_2S and SO_2 solutions are natural.

Fig: Glycerin

Advantages:

I. It is useful as humectants in keeping substances moist: owing to its hygroscopicity.
II. Its agreeable taste and high viscosity adapt it for many purposes.
III. Miscible with water, alcohol or methanol.

Disadvantages:

I. An explosion may occur if it is triturated with strong oxidizing agents such as chromium trioxide, potassium chlorate or potassium permanganate.
II. In dilute solution reactions proceed at a slower rate.
III. Iron is an occasional contaminates of it and may be the cause of a darkening in color.

Uses:

I. It has some therapeutic uses. In pure anhydrous form, it is used in the eye to reduce corneal edema and to facilitate opthalomoscopic examination.

II. It is used orally as an evacuant.
III. Because of its preservative qualities it is sometimes used as a stabilizer for solutions prepared with other solvents.

Liniments:

Liniments are alcoholic or oil based solutions or emulsions containing therapeutic agents intended for external application. They are intended for massage into the unbroken skin and can contain such ingredients as methyl salicylate or camphor as counterirritants.

These preparations may be liquids or semi solids that are rubbed onto the affected area, because of this, they were once called embrocations.

Advantages:

I. Liniments are very moisturizing and good for dry skin.
II. They have a low risk of sensization due to having few ingredients beyond the bases oil or fat and low irritation risk.

Disadvantages:

I. Strong Liniments and improper use may cause such problems as skin allergies, dryness, lesions and even a permanent thinning of the skin.

II. They are often disliked by patients due to greasiness.

Uses:

- Liniments are a common substance used by trainers and owners of horses. Liniments are especially useful in hot weather to help a hot horse cool down; the alcohols help the product to quickly evaporate.

Lotions:

Lotions are not defined specifically in the USP, but a broad definition describes them as either liquid or semi-liquid preparations that contain one or more active ingredients in an appropriate vehicle. Lotions may contain antimicrobial preservatives and other appropriate excipients such as stabilizers. Lotions are intended to be applied to the unbroken skin without friction. Lotions are usually suspensions of solids in an aqueous medium. Some lotions are in fact emulsions or solutions. Examples of official lotions are Benzyl Benzoate, N.F. Calamine Lotion, U.S.P. Hydrocortisone Lotion, N.F and White Lotion, N.F.

Fig: Lotion

Advantages:

I. The lotions have an acceptable color and odor.
II. Cosmetic lotions are applied to hair, scalp face and hands and are popular as sunscreen preparation.
III. They may be oily or hydroalcholic solutions or emulsions and frequently they contain glycerin, perfumes and preservatives.
IV. Formulation containing glycerin keeps the skin moist for a considerable period of time.

Disadvantages:

I. They need to be shaken well before each use.
II. Microorganisms may grow in certain lotions if no preservative is included.
III. Care should be taken to avoid contaminating the lotion during preparation, even if a preservative is present.

Uses:

- Lotions are used antiseptic and germicidal and are used in the treatment of skin disease and as cooling and mildly anesthetic applications for skin irritations.

Sweet and other viscid solutions

Solutions that are sweet or viscid include syrups, honeys, mucilage and jellies. All of these are viscous liquids or semisolids. The basic sweet or viscid substances giving body to these preparations are sugars, polyols or polysaccharides.

Syrup:

Syrups are concentrated, viscous, aqueous solutions of sugar or a sugar substitute with or without flavors and medical substances. When Purified Water alone is used in making the preparation is known as syrup, if the sucrose concentration is 85%.

Medicinally they are divided into two groups:

The Flavoring Syrup: Which are used as vehicle or flavor for prescriptions such as Acacia, Cherry, Cocoa, Orange and Raspberry USP.

The Medicated Syrup: Which contain ingredients giving them therapeutic value.

For example, tolu syrup is used as a cough expectorant and orange syrup contains dried bitter orange peel as a flavoring agent.

Fig: Syrup

Advantages:

I. An important advantage of syrup is their acceptability and wide variety of flavors.
II. As syrups can contain up to 85% of sugars they are capable of resisting bacterial growth.
III. They help to prevent crystallization and to maintain solubility of all ingredients.
IV. Syrups are also used to tablets particularly those with disagreeable aromas or acrid taste.
V. Sucrose based- syrups continuously administered to children apparently cause an aincreasedin dental caries and gingivitis.

Disadvantages:

I. In a closed container it is possible for surface dilution for a syrup to take place. This occurs as a result of solvent evaporations.
II. Syrup may produce a diluted layer which provides an ideal medium for the growth of certain microorganism.
III. A further problem with the storage and use of syrups involve the crystallization of the sugar within the screw containers thereby preventing its release.

Uses:

- The syrup dosage form is used for antibiotics, antihistamine, antitussives, sedative and vitamins.

Aqueous solutions:

The narrow definition in this subsection limits the solvent to water and excludes those preparations that are sweet or viscid in character and non-aqueous solutions.

This section includes those pharmaceutical forms that are designated as Douches, Aromatic waters, Enemas, Gargles, Mouthwashes, Nasal washes, Sprays, Otic solutions, Inhalations.

Douche:

A douche is a device used to introduce a stream of water into the body for medical or hygienic reasons, or the stream of water itself.

Advantages:

- It is used for recovering various vaginal irrigative diseases.

Disadvantages:

- Many health care professionals state that douching is dangerous, as it interferes with both the vagina's normal self-cleaning and with the natural bacterial culture of the vagina, and it might spread or introduce infections. For example, the U.S. Department of Health and Human Services strongly discourages douching, warning that it can lead to irritation, bacterial vaginosis, and pelvic inflammatory disease (PID). Frequent douching with water may result in an imbalance of the pH of the vagina, and thus may put women at risk for possible vaginal infections, especially yeast infections.

Fig: Douche

Uses:

- Douche usually refers to vaginal irrigation, the rinsing of the vagina, but it can also refer to the rinsing of any body cavity. A douche bag is a piece of equipment for douching—a bag for holding the fluid used in douching. To

avoid transferring intestinal bacteria into the vagina, the same bag must not be used for an enema and a vaginal douche.

Why Use:

- Vaginal douches may consist of water, water mixed with vinegar, or even antiseptic chemicals. Douching has been touted as having a number of supposed but unproven benefits. In addition to promising to clean the vagina of unwanted odors, it can also be used by women who wish to avoid smearing a sexual partner's penis with menstrual blood while having intercourse during menstruation. In the past, douching was also used after intercourse as a method of birth control, though it is not effective.

Aromatic Water:

Water which is a lightly scented perfume used as a skin freshener. It is referred to as "aromatic waters" and has high alcohol content. It is usually applied directly to the skin after bathing or shaving. It is considered a "weak" perfume, weaker than cologne. Aromatic water is defined as a dilute perfume. It was originally composed of alcohol and various volatile oils.

Fig: Aromatic Water

Advantages:

- Aromatic water can be used as viscosity imparting agent for solutions and also it can musk the bad odor of medicated solution.

Disadvantages:

- It can alter the pH of the solution which may cause drug degradation. It is also sometimes incompatible with the medication.

Pharmaceutical Use:

A sweetened aromatic solution of alcohol and water, serving as a vehicle for medicine. Some aromatic waters have therapeutic value.

Enemas

An enema (plural enemata or enemas) is the procedure of introducing liquids into the rectum and colon via the anus. The increasing volume of the liquid causes rapid expansion of the lower intestinal tract, often resulting in very uncomfortable bloating, cramping, and powerful peristalsis, a feeling of extreme urgency and complete evacuation of the lower intestinal tract.

Enemas can be carried out as treatment for medical conditions, such as constipation and encopresis, and as part of some alternative health therapies. They are also used to administer certain medical or recreational drugs. Enemas have been used for rehydration therapy (proctoclysis) in patients for whom IV therapy is not applicable.

Advantages:

- Can bypass the first pass effect. So, bioavailability is higher.

Disadvantages:

- Improper administration of an enema may cause electrolyte imbalance (with repeated enemas) or ruptures to the bowel or rectal tissues resulting in internal bleeding. However, these occurrences are rare in healthy, sober adults. Internal bleeding or rupture may leave the individual exposed to infections from intestinal bacteria. Blood resulting from tears in the colon

may not always be visible, but can be distinguished if the feces are unusually dark or have a red hue. If intestinal rupture is suspected, medical assistance should be obtained immediately.

Uses:

The main medical usages of enemas are:

I. As a bowel stimulant, not unlike a laxative – the main difference being that laxatives are commonly thought of as orally administered while enemas are administered directly into the rectum, and thereafter, into the colon. When the enema injection into the rectum is complete, and after a set "holding time", the patient expels feces along with the enema in the bedpan or toilet.

II. Enemas may also be used to relieve constipation and fecal impaction, although in the U.S.A. and some other parts of the world, their use has been replaced in most professional health-care settings by oral laxatives and laxative suppositories. In-home use of enemas for constipation and alternative health purposes is somewhat harder to measure.

III. Bowel stimulating enemas usually consist of water, which works primarily as a mechanical stimulant, or they may be made up of water with baking soda (sodium bicarbonate) or water with a mild hand soap dissolved in it; buffered sodium phosphate solution, which draws additional water from the bloodstream into the colon and increases the effectiveness of the enema – which often can be rather irritating to the colon, causing intense cramping or "griping" – or mineral oil, which functions as a lubricant and stool softener, but which often has the side effect of sporadic seepage from the patient's anus which can soil the patient's undergarments for up to 24 hours. Other

types of enema solutions are also used, including equal parts of milk and molasses heated together to slightly above normal body temperature. In the past, castile soap was a common additive in an enema, but it has largely fallen out of use because of its irritating action in the rectum and because of the risk of chemical colitis as well as the ready availability of other enema preparations that are perhaps more effective than soap in stimulating a bowel movement. At the opposite end of the spectrum, an isotonic saline solution is least irritating to the rectum and colon, having a neutral concentration gradient. This neither draws electrolytes from the body – as can happen with plain water – nor draws water into the colon, as will occur with phosphates. Thus, a salt water solution can be used when a longer period of retention is desired, such as to soften an impaction.

IV. Cleansing the lower bowel prior to a surgical procedure such as sigmoidoscopy or colonoscopy. Because of speed and supposed convenience, enemas used for this purpose are commonly the more costly, sodium phosphate variety – often called a disposable enema. A more pleasant experience preparing for testing procedures can usually be obtained with gently-administered baking soda enemas; cleansing the lower bowel for colonoscopy and other bowel studies can be effectively achieved with water-based, or water with baking soda, enema administration.

V. The administration of substances into the bloodstream. This may be done in situations where it is undesirable or impossible to deliver a medication by mouth, such as antiemetic given to reduce nausea (though not many antiemetics are delivered by enema). Additionally, several anti-antigenic agents, which work better without digestion, can be safely administered via a gentle enema. Medicines for cancer, for arthritis, and for age-related macular degeneration are often given via enema in order to avoid the normally-

functioning digestive tract. Interestingly, some water-based enemas are also used as a relieving agent for Irritable Bowel Syndrome, using cayenne pepper to squelch irritation in the colon and rectal area. Finally, an enema may also be used for hydration purposes. See also route of administration.

VI. The topical administration of medications into the rectum, such as corticosteroids and mesalazine used in the treatment of inflammatory bowel disease. Administration by enema avoids having the medication pass through the entire gastrointestinal tract, therefore simplifying the delivery of the medication to the affected area and limiting the amount that is absorbed into the bloodstream.

VII. General anesthetic agents for surgical purposes are sometimes administered by way of an enema. Occasionally, anesthetic agents are used rectally to reduce medically-induced vomiting during and after surgical procedures, in an attempt to avoid aspiration of stomach contents.

VIII. A barium enema is used as a contrast substance in the radiological imaging of the bowel. The enema may contain barium sulfate powder, or a water-soluble contrast agent. Barium enemas are sometimes the only practical way to "view" the colon in a relatively safe manner. Following barium enema administration, patients often find that flushing the remaining barium with additional water, baking soda, or saline enemas helps restore normal colon activity without complications of constipation from the administration of the barium sulfate.

Gargles:

Gargles are aqueous solutions frequently containing antiseptics, antibiotics or anesthetics used for treating the pharynx and nasopharyngs by forcing air from the lungs through the gargle that is held in the throat; subsequently, the gargle is expectorated. Many gargles must be diluted with water prior to use.

Advantages:

I. A gargle containing the antibiotic tyrothricin has been shown to provide levels of gramicidin.
II. A gargle containing the tyrothiricin, in saliva when used as a gargle rather than a mouthwash.
III. Rapid relief of pharyngeal and oral pain by gargles.

Uses:

- Gargle is used in the treatment of pharyngitis or Vincent's stomaitis. It is also been applied in root canals of teeth or other dental pulp cavities. While used topically as a 1.5-3% solution for cleansing wounds.

Mouthwash:

Mouthwash or mouth rinse is a product used to enhance oral hygiene. Some manufacturers of mouthwash claim that antiseptic and anti-plaque mouth rinse kill the bacterial plaque causing caries, gingivitis, and bad breath. Anti-cavity mouth rinse uses fluoride to protect against tooth decay. It is, however, generally agreed that the use of mouthwash does not eliminate the need for both brushing and flossing. As per the American Dental Association, regular brushing and proper flossing are enough in most cases although the ADA has placed its Seal of Approval on many mouthwashes containing alcohol (in addition to regular dental check-ups). However, one Australian researcher believes mouthwash should only be used as a short-term solution.

Fig: Mouthwash

Mouthwash may also be used to help remove mucus and food particles deeper down in the throat. Alcoholic and strongly flavored mouthwash may cause coughing when used for this purpose.

Advantages:

- Can be used several times.

Disadvantages:

- A literature review by McCullough and Farah from 2008 published in the Dental Journal of Australia concluded that there is "sufficient evidence" that "alcohol-containing mouthwashes contribute to the increased risk of development of oral cancer". The authors also state that the risk of acquiring cancer rises almost five times in alcohol-containing mouthwash users who neither smoke nor drink (with a higher rate of increase in those who do). In addition, the authors highlight side effects from several mainstream mouthwashes that included dental erosion and accidental poisoning of children.

Uses:

- Common use involves rinsing the mouth with about 20ml (2/3 fl oz) of mouthwash two times a day after brushing. The wash is typically swished or gargled for about half a minute and then spat out. In some brands, the expectorate is stained, so that one can see the bacteria and debris. It is probably advisable to use mouthwash at least an hour after brushing with toothpaste when the toothpaste contains sodium lauryl sulfate, since the anionic compounds in the SLS toothpaste can deactivate cationic agents present in the mouth rinse.

Nasal solutions:

Nasal solutions are usually aqueous solutions designed to be administered to the nasal passages in drops or sprays. Other nasal preparations may be in the form of emulsions or suspensions.

The adult nasal cavity has about a 20 ml capacity with a large surface area (about 180 cm3) for drug absorption afforded by the microvilli present along the pseudo-stratified columnar epithelial cells of nasal mucosa.

Fig: Nasal wash

Advantages:

I. The nasal tissue is highly vuscularised making it an attractive site for rapid and efficient systemic absorption.
II. Another advantage of nasal delivery is that it avoids first pass metabolism by the liver.
III. For some peptides and small molecular compounds, intranasal, bioavailability has been comparable to that of injections.

IV. The drug will no exposed to hostile environment of GIT.

Disadvantages:

I. Bioavailability decreases as the molecular weight of a compound increases and for protein composed of more than 27 amino cids bioavailability may be low.
II. Various pharmaceutical techniques and functional excipients, such as surfactants have been shown to be capable of enhancing the nasal absorption of large molecule.

Uses:

- Many drugs are administered for their local sympathomimetic effects to reduce nasal congestion, such as Ephedrine sulphate Nasal solutions, USP or Nphazoline Hydrochloride Nasal solution USP. A few other preparations, Lypressin Nasal solution USP and oxytocin nasal solutions USP re administered in sprays from for their systemic effect for the treatment of diabetes insipid and milk let down prion to breast feedings respectively.

Sprays:

Currently no sprays for use in atomizers are recognized by the official compendia. However there are a number of commercially available nasal decongestants, antihistaminic and anti-infective. These include drugs such as ephedrine, hydroxy amphetamine, phenylephirene, naphaazoline, tripelennamine, chlorobutanol, sulfonamides, nitrofurazone, oxymetazoline, tetrahydrozoline, tuminoheptane, cyclopentamine and cetylpyridium. These nasal solutions are aqueous in nature.

Fig: Spray

Otic Solutions:

These solutions occasionally are referred to as ear oral preparation. Other otic preparations include suspensions and ointments for topical application in the ear. Ear preparations are usually placed in amounts for the removal of excessive ceriman (ear wax) or for the treatment of ear infections, inflammation or pain. Otic solutions may contain appropriate buffers, solvents and dispersants usually in an aqueous solution.

Fig: Otic Solutions

Advantages:

I. Rapid delivery of drugs to the site action of action.
II. Avoids first pass metabolism.
III. The drug will not exposed to hostile environment of GIT.

Disadvantages:

I. Appropriate quantity cant given sometimes.
II. It creates skin irritation sometime

Uses:

- The main class of drugs are used for topical administrations to the ear include analgesic, such as benzocaine, antibiotics such as neomycin and anti-inflammatory agents such as cortisone. The USP preparations include Antipyrine and Benzocaine otic solutions. The Neomycin and Polymyxin B sulfates and Hydrocortisone.

Inhalations:

Inhalations are drugs or solutions or suspensions of one or more drugs substances administered to the nasal or oral respiratory route for local or systemic effect. Solutions of drug substances in sterile water for inhalation or in sodium chloride inhalation solution may be nebulized by the used of inert gases.

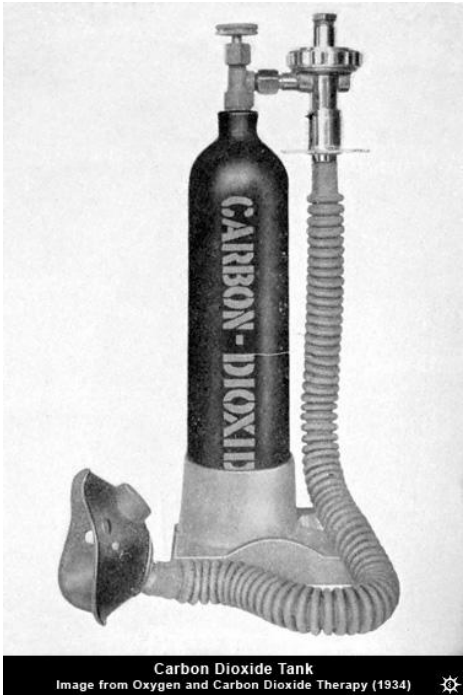

Fig: Inhalation

Advantages:

I. The vapor of the drug is inhaled into the nostrils when needed to relieve nasal congestions due to cold and high fever.
II. It may also be employed to relieve ear block and the pressure pain in air travelers.

Disadvantages:

I. The content containers must be tightly closed after each opening to prevent loss of the drug vapors.

Uses:

- The effects of the drug are rapid and are used in the treatment of anginal pain.