

*Enema for Stricture of the Rectum.*

- ℞. Bismuthi Subcarb ..... ʒj.  
 Extracti Opii, ..... gr. ij.  
 Glycerini, Aquæ, ..... āā ʒij.  
 M. Fiat enema. Sig.—Two tablespoonfuls to be injected thrice weekly.

*Demulcent Enema.*

- ℞. Tincturæ Opii, ..... ℥xx.  
 Decocti Amyli, ..... ʒiv-vj.  
 M. Fiat enema.

*Vermifuge Enema.*

- ℞. Fluidextr. Quassia, ..... ʒjss.  
 Aquæ, ..... ʒijss.  
 M. Sig.—A tablespoonful with an equal quantity of warm water, as an enema, to be retained as long as possible.

*Nasal Injection.*

- ℞. Phenolis, cryst., ..... gr. xxiv.  
 Sodii Boratis, ..... āā ʒij  
 Sodii Bicarb., ..... āā ʒij  
 Glycerini, ..... ʒss.  
 Aquæ Destil. q. s. ad. .... Oj.  
 M. Sig.—To be used twice daily in a nasal syringe or sprayer. (*Dobell's Solution*).

**Lamellæ, Discs**,—are small discs of gelatin with some glycerin, and medicated with a minute quantity of an alkaloid, for use on the ocular conjunctiva. In the British Pharmacopœia four such preparations are official, viz.—

**Lamellæ Atropinæ, Discs of Atropine**,—each disc contains  $\frac{1}{1000}$  grain of Atropine Sulphate.

**Lamellæ Cocainæ, Discs of Cocaine**,—each disc contains  $\frac{1}{10}$  grain of Cocaine Hydrochloride.

**Lamellæ Homatropinæ, Discs of Homatropine**,—each disc contains  $\frac{1}{100}$  grain of Homatropine Hydrobromide.

**Lamellæ Physostigminæ, Discs of Physostigmine**,—each disc contains  $\frac{1}{1000}$  grain of Physostigmine Sulphate.

**Linimenta, Liniments**,—are very thin ointments for external application, intended to be applied with friction to the skin. They are solutions of various substances in oily liquids or in alcoholic liquids containing fatty oils. Of the following 8 official Liniments 2 have as their basis Cotton-seed Oil, 1 Linseed Oil, 1 Oil of Turpentine, 2 Alcohol, 1 Alcohol and Water, and 1 a fluidextract (*Linimentum Belladonnæ*).

Linimentum Ammonia.  
 Linimentum Belladonnæ  
 Linimentum Calcis.  
 Linimentum Camphoræ.

*Injection for Gonorrhœa.*

(Injection Brou.)

- ℞. Zinci Sulphatis, ..... gr. viij.  
 Plumbi Acetatis, ..... gr. xv.  
 Tincturæ Opii, ..... ʒij.  
 Tinct. Catechu, ..... ʒj.  
 Aquæ Rosæ, q. s. ad. .... ʒvj.  
 M. Fiat injectio. Sig.—Use with a urethral syringe.

*Injection for Chronic Urethritis.*

- ℞. Hydrarg. Chl. Corrosivi, . . gr. ʒ.  
 Zinci Chloridi, ..... gr. ss.  
 Aquæ Destillatæ, ..... ʒviij.  
 M. Sig.—A tablespoonful to be injected well down into the urethra thrice daily, through a gum catheter.

*Vaginal Injections for Leucorrhœa.*

- ℞. Aluminis, ..... ʒj.  
 Zinci Sulphatis, ..... ʒss.  
 Sodii Boratis, ..... gr. iv.  
 M. Sig.—Dissolve in half-a-pint of warm water, and use with a vaginal syringe.  
 ℞. Acidi Tannici, ..... ʒj.  
 Glycerini, ..... ʒiv.  
 M. Sig.—One-half with an equal quantity of water to be injected twice daily.

Linimentum Chloroformi.  
 Linimentum Saponis.  
 Linimentum Saponis Mollis.  
 Linimentum Terebinthinæ.

Besides the above, (except Lin. Saponis Mollis), the Br. Phar. contains Lin. Aconiti, Lin. Camphoræ Ammoniatum, Lin. Crotonis, Lin. Hydrargyri, Lin. Opii, Lin. P. tassi Iodidi cum Sapone, Lin. Sinapis, and Lin. Terebinthinæ Aceticum.

Extemporaneous Liniments may correspond to the official ones or they may be simple mixtures of fluids without either fat or soap. A prescription for each kind is appended. The official *Linimentum Saponis* (soap liniment) is a good basis for extemporaneous preparations of this class.

*Compound Chloroform Liniment.*

- ℞. Fluidextr. Belladon. Rad., . ʒss.  
 Fluidextr. Aconiti,  
 Chloroformi, ..... āā ʒij.  
 Spiritus Cam horæ, ..... ʒj.  
 Alcoholis Diluti, q. s. ad. .... ʒviij.  
 M. Fiat linimentum.  
 Sig.—Poison. To be rubbed on the painful part.

*Anodyne Liniment.*

- ℞. Tinct. Aconiti, ..... ʒij.  
 Tinct. Opii, ..... ʒiv.  
 Tinct. Arnica, ..... ʒj.  
 Chloroformi, ..... ʒij.  
 Linim. Saponis, q. s. ad. .... ʒiv.  
 M. Fiat linimentum.  
 Sig.—Poison. Liniment.

An Embrocation is a similar preparation, but of thinner consistence. The term is almost obsolete.

**Liquores, Solutions**,—comprise all aqueous solutions of non-volatile substances, except the syrups, infusions and decoctions, which naturally form distinctive classes. There are 25 official solutions, 13 of which are *simple solutions* of the medicament, the rest being *chemical solutions*, in which the dissolved substances are altered by chemical action and new ones formed. They are named as follows:—

Liquor Acidi Arsenosi.  
 Liquor Ammonii Acetatis.  
 Liquor Antisepticus.  
 Liquor Arseni et Hydrargyri Iodidi.  
 Liquor Calcis.  
 Liquor Chlori Compositus.  
 Liquor Cresolis Compositus.  
 Liquor Ferri Chloridi.  
 Liquor Ferri et Ammonii Acetatis.  
 Liquor Ferri Subsulphatis.  
 Liquor Ferri Tersulphatis.  
 Liquor Formaldehydi.  
 Liquor Hydrargyri Nitrat.

*Stokes' Liniment.*

- ℞. Olei Terebinthinæ, ..... ʒijj.  
 Acidi Acetici, ..... ʒss.  
 Olei Limonis, ..... ʒj.  
 Vitellum, ..... j.  
 Aquæ Rosæ, ..... ʒijj.  
 M. Fiat linimentum.  
 Sig.—Liniment.

*Army Medical Wagon Liniment.*

- ℞. Aquæ Ammonia,  
 Ol. Terebinthinæ,  
 Ol. Olivæ,  
 āā, partes æquales.  
 M. Fiat linimentum.  
 Sig.—Liniment.

Liquor Iodi Compositus.  
 Liquor Magnesii Citratis.  
 Liquor Plumbi Subacetatis.  
 Liquor Plumbi Subacetatis Dilutus.  
 Liquor Potassii Arsenitis.  
 Liquor Potassii Citratis.  
 Liquor Potassii Hydroxidi.  
 Liquor Sodæ Chlorinatæ.  
 Liquor Sodii Arsenatis.  
 Liquor Sodii Hydroxidi.  
 Liquor Sodii Phosphatis Compositus.  
 Liquor Zinci Chloridi.

**Lotio, A Lotion or Wash** (Unofficial),—is a solution or mixture of medicinal agents, intended for external application; usually consisting of some soluble, astringent salt, dissolved in water, with perhaps some glycerin or alcohol. A *Fomentation (Fotus)* is a similar preparation used hot, or flannel may be wrung very dry out of boiling water, applied and covered with oiled silk. *Spongipiline*, a fabric composed of sponge and wool coated with rubber, is an excellent vehicle for the application of warmth and moisture. The inner surface is moistened with hot water and its utility may be increased by sprinkling the

moistened surface with charcoal or yeast, or by saturating it with any desired lotion or liniment. A *Collyrium* is an eye-wash, and generally contains a soluble astringent salt dissolved in rose-water or distilled water, in the proportion of gr. j-iv to the ℥. The only official preparation suitable for a lotion is the *Liquor Plumbi Subacetatis Dilutus* (Lead-water). A well-known anodyne, refrigerant and astringent lotion is that represented by the upper two of the following prescriptions.

*Lead-water and Laudanum.*

℞. Liq. Plumbi Subacetatis, . . . ℥j.  
Tinct. Opii, . . . . . ℥j.  
Aquæ, q. s. ad, . . . . . ℥viiij.  
M. Fiat lotio. Sig.—Lotion.

(Gross.)

*Collyrium.*

℞. Sodii Boratis, . . . . . gr. x.  
Aquæ Camphoræ, . . . . . ℥ij.  
Mucil. Cydonii,  
Aquæ Destil., . . . . . āā ℥ss.  
M. Fiat collyrium. Sig.—Eye-water; a few drops to be put into the eye three or four times daily.

*Lead and Opium Wash.*

℞. Liq. Plumbi Subacetatis,  
Tinct. Opii, . . . . . āā ℥j.  
Aquæ, q. s. ad, . . . . . ℥viiij.  
M. Fiat lotio. Sig.—Lotion.

(Sturgis.)

*Collyrium of Four Sulphates.*

℞. Zinci Sulphatis,  
Ferri Sulphatis,  
Cupri Sulphatis,  
Aluminis, . . . . . āā gr. j.  
Aquæ Destillatæ, . . . . . ℥j.  
M. Fiat collyrium. Sig.—For use with brush to palpebral conjunctivæ, and to be washed off with clean water.

**Massæ, Masses,**—are Pill-masses prepared as described under the subtitle *Pilulæ*. The official Masses number 2, viz.—

Massa Ferri Carbonatis.

Massa Hydrargyri.

**Mellita, Honeys,**—differ from syrups merely in being prepared with honey as a base. The *Oxymel* and *Oxymel Scillæ* of the B. P. are similar preparations, containing also Acetic Acid. There are 3 official Honeys, including two forms of honey itself, viz.—

Mel.

Mel Depuratum.

Mel Rosæ.

**Misturæ, Mixtures,**—in official pharmacy are aqueous preparations of *insoluble* substances held in suspension by a suitable vehicle. In extemporaneous pharmacy the term mixture has a wider signification, as explained below. Mixtures are generally prepared extemporaneously upon prescriptions, as few of them have the stability necessary to insure their preservation beyond a few days. The official mixtures are 4 in number, and are named as follows,—

Mistura Cretæ.

Mistura Ferri Composita.

Mistura Glycyrrhizæ Composita.

Mistura Rhei et Sodæ.

In extemporaneous pharmacy the term *Mixture* is applied to every fluid compound intended for internal use, except a few which bear distinctive titles, as Emulsions, Draughts, Enemas, Elixirs and Drinks. The simplest form of mixture in this extended sense is that in which two or more liquids are mixed together; but a great variety of substances may be prescribed in this form,

chief among which are most of the soluble salts, light insoluble powders, salts which may be diffused by agitation, extracts, gum-resins, and the fixed essential oils. They are generally ordered in 2, 3, 4, 6, 8, 10 and 12-ounce vials.

Substances suitable to the mixture-form, properly so called, are those which, though more or less insoluble in water, will mix therewith by means of agitation, trituration, etc. Those most frequently ordered are as follows:—

*Diffused by Agitation:—*

Calcii Phosphas Præcipitatus.  
Cinchona (powdered).  
Ipecacuanha (powdered).  
Magnesia.  
Quininæ Sulphas.  
Sulphur Præcipitatum.

*Suspended by Viscid Excipients:—*

Essential Oils.  
Oleum Amygdalæ.  
Oleum Morrhuæ.  
Oleum Olivæ.  
Oleum Ricini.  
Copaiba.  
Ferri Carbonas Saccharatus.

*Best Suspended by the aid of a Fixed Oil or Yolk of Egg:—*

Extr. Cannabis Indicæ.  
Camphora.

*Miscible only by Trituration:—*

Ammoniacum.  
Asafoetida.  
Confectio Rosæ.  
Confectio Sennæ.  
Extractum Aconiti.  
Extr. Belladonnæ Fol.  
Extr. Conii.  
Extr. Hyoscyami.  
Extr. Stramonii.  
Extr. Glycyrrhizæ.  
Extr. Krameriæ.  
Extr. Taraxaci.  
Guaiaicum.  
Scammonium.  
Myrrha.

Oleum Terebinthinæ.  
Chloroformum.

Solutions intended for internal administration are classed as Mixtures in extemporaneous pharmacy, for the reasons already stated. The following list of acids and salts comprises most of the solids which are best adapted for use in liquid form, by reason of their solubility in water.

Acidum Citricum.	Ferri et Potassii Tartras.	Potassii Tartras.
Acidum Tannicum.	Ferri et Quininæ Citras.	Potassii et Sodii Tartras
Acidum Tartaricum.	Magnesii Sulphas.	Morphinæ Acetas.
Alumen.	Mangani Sulphas.	Morphinæ Hydrochloridum.
Ammonii Chloridum.	Potassii Acetas.	Morphinæ Sulphas.
Antim. et Potass. Tartras.	Potassii Bicarbonas.	Sodii Bicarbonas.
Barii Chloridum.	Potassii Bromidum.	Sodii Boras.
Calcii Chloridum.	Potassii Carbonas.	Sodii Carbonas.
Calcii Hypophosphis.	Potassii Citras.	Sodii Chloridum.
Ferri Pyrophosphas.	Potassii Chloras.	Sodii Hypophosphis
Ferri Sulphas.	Potassii Hypophosphis.	Sodii Phosphas.
Ferri et Ammonii Citras.	Potassii Iodidum.	Sodii Sulphas.

A few require the use of viscid substances as vehicles or correctives. They are as follows:—

Ammonii Carbonas.  
Plumbi Acetas.

Potassii Hydroxidum.  
Potassii Cyanidum.  
Hydrargyri Chloridum Corrosivum.

Certain salts are best ordered by prescribing such agents as when in solution together react upon each other and produce the desired salt. Instances of this may be found in the pharmacopœial processes for most of the official Liquores, some salts so produced being the following:—

Ammonii Acetas.	Ferri Acetas.	Potassii Arsenis.
Magnesii Citras.	Ferri Chloridum.	Potassii Hydroxidum.
Potassii Citras.	Ferri Nitras.	Sodii Hydroxidum.
Ferri Citras.	Hydrargyri Nitras.	Zinci Chloridum.

Certain other substances require the addition of other agents in order to form eligible solutions. Such are the following:—

**Quinine Sulphate**,—requires acidulated water for its solution, the acid used being generally Diluted Sulphuric, or the Aromatic Sulphuric. This method of prescribing the salt develops its bitter taste to the utmost, and is often avoided by ordering the drug to be suspended in a viscid liquid, such as Pulv. Acaciæ in Syrup of Ginger. In such a case an officious dispenser anxious to show his smartness by adding some dilute Sulphuric Acid to dissolve the Quinine would thereby defeat the object of the prescriber.

Quinine Sulphate may be prescribed with Aromatic Spirit of Ammonia, Spirit of Nitrous Ether, Tinctures or other alcoholic preparations together with Glycerin or Syrup and Water. In such cases the salt should be first dissolved in the alcoholic portion of the prescription, then the glycerin or syrup and finally the aqueous portions should be added gradually. It may also be ordered with Diluted Sulphuric Acid and some vegetable infusion containing Tannin, in which case a precipitate of Quinine Tannate will be produced. This of course should not be filtered, but should be dispensed with a "Shake-label."

For the use of *Velatine* as a vehicle for the administration of Quinine Salts, see under the title CINCHONA, in Part I.

**Chinoidin, Cinchonine Sulphate and Quinidine Sulphate**,—also require the addition of a dilute mineral acid for their solution in aqueous mixtures.

**Iodine**,—requires the addition of Potassium Iodide for its solution in a convenient quantity of water, as in the case of the official Liquor Iodi Compositus.

**Hydrargyri Iodidum Rubrum, Red Mercuric Iodide**,—requires the addition of Potassium Iodide or Mercuric Chloride for its aqueous solution

**Potassii Bitartras, Cream of Tartar**—requires the addition of Borax or Boric Acid for its solution in water.

**Sodium Phosphate**,—is theoretically soluble in 6 parts of water, but in practice it is soluble with difficulty in aqueous preparations unless Citric Acid be added.

**Benzoic Acid**,—requires the addition of Borax to aid its solubility in water an equal part of the latter making it 5 times more soluble than when alone.

**Lime**,—is more soluble in sweetened water than in plain water, the sugar aiding its solution.

*Excipients* are substances which give form and consistence to prescriptions, and serve as vehicles for the exhibition of the other ingredients. Some of the excipients are *Diluents*, or agents which effect the dilution or division of the active ingredients; while others act in the double capacity of diluents and *Flavoring agents*. The Excipients most generally used in mixtures may be tabulated as follows,—

<i>Diluents.</i>		<i>True Excipients.</i>
Water (Aqua).		Acacia (in powder or mucilage).
Medicated Waters (Aqua).		Tragacanth (in powder or mucilage).
Syrups.		Confections. Sugars.
Mel Rosæ.		Some Extracts.
Elixir Aromaticum.		Yolk of Egg (Vitellus).
	<i>Flavoring Agents.</i>	
Oleum Amygd. Amaræ.	Tinct. Cardamomi.	Spiritus Anisi.
Oleum Cari.	Tinct. Cardamomi Comp.	Spiritus Lavandulæ.
Oleum Caryophylli.	Tinct. Cinnamomi.	Spiritus Menthæ Piperitæ.
Oleum Cinnamomi.	Tinct. Gentianæ Comp.	Spiritus Menthæ Viridis.
Oleum Gaultheriæ.	Tinct. Tolutana.	Syrupus Tolutanus.
Oleum Sassafras.	Tinct. Vanillæ.	Syrupus Zingiberis.
Tinct. Aurantii Dulcis.	Tinct. Zingiberis.	

Compounding the Mixture is a matter of no slight importance, and one which is best learned at the dispensing counter, though a few directions may not be out of place. In the case of the simplest form of mixture, where two or more fluid preparations are prescribed together, the only operations required are the measuring of the several ingredients and pouring them into the vial. In doing this the compounder should pursue a regular and definite order of procedure. Taking in his left hand a graduate of sufficient capacity to hold the whole quantity prescribed, he should walk alongside the shelves, and with the right hand pour from the stock-bottles the requisite quantity of each ingredient in the order in which they are entered on the prescription. A skillful druggist will hold the graduate between the thumb and first finger, the prescription between the second and third fingers, and the stopper of the stock-bottle between the little finger and the hand, leaving his right hand free for the manipulation of the bottles containing the ingredients.

When an actively poisonous agent is ordered it should always be the last thing put into the mixture. Attention to this rule will prevent the danger of the toxic substance being put in twice.

The order in which the ingredients are put together is not of so much importance in compounding a simple mixture as in the case of an emulsion, and the order of the prescription can usually be followed, with the exception noted in the preceding paragraph. Still, when several alcoholic preparations, syrups and waters are ordered together, it is good practice first to mix the alcoholic fluids, then to add the syrups and finally the water, so as to avoid the precipitation of resinous principles which would occur if the alcoholic solutions were added to the water. Distilled water should always be used, in order to insure uniformity in taste and appearance, and also as a matter of purity and cleanliness. All mixtures should be well shaken before being labelled.

Solids which are comparatively insoluble or slowly soluble require to be rubbed up in a mortar with one or more of the fluid ingredients. Glass mortars are much employed for this purpose, and many compounders mix all the ingredients in such a mortar before transferring them to the vial. Vegetable powders, (rhubarb, ipecac, etc.), or finely pulverized inorganic substances, are often ordered in intimate mixture with water, thickened with mucilage or syrup. In such cases the mixture should be made in a porcelain or wedgewood mortar, enough mucilage or syrup being added at first to make a thick paste, and after this is rubbed smooth the water may be gradually added during the continued process of mixing. This process will answer for all inorganic substances in powder, except Magnesia, which is best mixed by being thrown on the surface of the water; after it has sunk to the bottom as a uniform sediment the other ingredients may be added and the whole well shaken. Froth upon the surface of the liquid, which often arises after agitation and may prevent the corking of the bottle, will quickly subside on the addition of a few drops of alcohol.

The following are specimens of prescriptions for medicines to be administered in mixture form:—

<i>Bismuth Mixture for Children.</i>		<i>Quinine Mixture for Children.</i>	
R̄.	Bismuthi Subcarbonatis, .. ℥ij.	R̄.	Quininæ Sulphatis (pulv.), . ℥ss.
	Syrupi Acaciæ,		Acaciæ (pulv.),..... ℥ss.
	Aquæ Cinnamomi,..... āā ℥ij.		Syrupi Zingiberis,..... ℥iv.
	Misce. Sig.—A teaspoonful every hour		Fiat mistura. Sig.—A teaspoonful thrice
	in choleraic diarrhea.		daily.

**Mucilagines, Mucilages**,—are thick, viscid liquids prepared by dissolving gum in water, or by extracting with water the mucilaginous principles from certain plants. They are easily spoiled and should be kept only in small quantities. The official Mucilages number 4, as follows, the first two being prepared without heat, the last two with heat,—

Mucilago Acaciæ.	Mucilago Tragacanthæ.
Mucilago Sassafras Medullæ.	Mucilago Ulmi.

**Oleata, Oleates**,—are liquid solutions of metallic salts or alkaloids in Oleic Acid, intended for external administration. They are not definite chemical compounds, though the term is also employed in trade to designate certain solid preparations which are claimed to be chemical compounds of the same acid with various bases. [See under ACIDUM OLEICUM, page 77.] There are 5 official Oleates, three of which have olive oil, as well as oleic acid. They are named as follows:—

Oleatum Atropinæ (2 per cent.).	Oleatum Hydrargyri (25 per cent.).
Oleatum Cocainæ (5 per cent.).	Oleatum Quininæ (25 per cent.).
	Oleatum Veratrinæ (2 per cent.).

**Oleoresinæ, Oleoresins**,—are liquid preparations consisting principally of natural oils and resins extracted from vegetable substances by percolation with Acetone. They differ from fluidextracts in not bearing any uniform relation of Cc. to the gramme of drug, in containing principles which though soluble in acetone are not so in alcohol, and in some instances being devoid of principles which are insoluble in acetone but soluble in alcohol. They are the most concentrated liquid preparations of drugs which can be produced, and are prepared by percolating the powdered drug with acetone until exhausted, recovering the greater part of the acetone by distillation, and exposing the residue in a capsule to spontaneous evaporation until the remaining acetone has evaporated. In one case, that of Cubeb, the medium of extraction is alcohol. The official Oleoresins are 6 in number, viz.—

Oleoresina Aspidii.	Oleoresina Lupulini.
Oleoresina Capsici.	Oleoresina Piperis.
Oleoresina Cubebæ.	Oleoresina Zingiberis.

**Pigmenta, Paints**, (Unofficial),—are preparations for external use, which cannot be classed with the preceding. They are generally prescribed in skin

diseases, for use over inflamed joints, or for application to the throat with a camel's-hair brush.

R̄.	Tinct. Iodi,..... ℥j.	R̄.	Alcoholis, Saponis Mollis,
	Ætheris,..... ℥iij.		Olei Cadini,..... āā ℥j.
	Tinct. Aconiti,..... ℥ss.		Sig.—Paint over the part.
	Fluidextr. Belladon. Rad.,... ℥iv.		
	Morphinæ Sulph.,..... gr. ij.	R̄.	Olei Tiglii,..... ℥j.
	Iodi,..... ℥jss.		Ætheris,..... ℥ij.
	Sig.—Paint 4 or 5 coats freely over the		Tinct. Iodi,..... ℥v.
	inflamed and painful parts.		M. Sig.—Paint on once in 3 days.

**Pilulæ, Pills**,—are spherical masses composed of medicinal agents and intended to be swallowed whole. The *mass* consists of the active ingredients and the *excipient*, the latter being the substance which gives to the mass its adhesive and plastic qualities. In official pharmacy the excipients are specified both as to composition and quantity in each case, and those directed to be used in the preparation of the 2 official Masses and the 14 official Pills are as follows,—

- 3 are made with *Soap and Water*,—Pil. Aloes, Pil. Asafœtidæ, Pil. Opii.
- 1 is made with *Water* alone,—Pilulæ Rhei Compositæ.
- 3 with *Diluted Alcohol*,—Pil. Aloes et Mastiches, Pil. Catharticæ Comp., Pil. Catharticæ Vegetabiles.
- 2 with *Syrup*,—Pil. Aloes et Myrrhæ, Pil. Laxativæ Compositæ.
- 2 with *Glycerin and Water*,—Pil. Ferri Carbonatis, Pil. Phosphori.
- 1 with *Acacia and Water*,—Pilulæ Ferri Iodidi.
- 1 with *Acacia, Glycerin and Syrup*,—Pil. Podophylli, Belladonnæ et Capsic.
- 1 with *Confection of Rose*,—Pilulæ Aloes et Ferri.
- 1 with *Honey, Syrup and Water*,—Massa Ferri Carbonatis.
- 1 with *Glycerin and Honey of Rose*,—Massa Hydrargyri.

The pharmacopœial directions for the formation of the pill-mass vary in each case, but in general they prescribe that the ingredients shall be mixed intimately, then beaten with the excipient to form a mass and divided into a certain number of pills. Two of the official pills are directed to be coated with an ethereal solution of the balsam of Tolu,—Pilulæ Ferri Iodidi and Pilulæ Phosphori. Full descriptions of the various details of pill-making are given on the next page.

The number of official pills is 14, for the composition of which the student is referred to their several titles in the section on Materia Medica. They are named as follows,—

Pilulæ Aloes.	Pilulæ Ferri Carbonatis.
Pilulæ Aloes et Ferri.	Pilulæ Ferri Iodidi.
Pilulæ Aloes et Mastiches.	Pilulæ Laxativæ Compositæ.
Pilulæ Aloes et Myrrhæ.	Pilulæ Opii.
Pilulæ Asafœtidæ.	Pilulæ Phosphori.
Pilulæ Catharticæ Compositæ.	Pilulæ Podophylli, Belladonnæ et Capsici.
Pilulæ Catharticæ Vegetabiles.	Pilulæ Rhei Compositæ.

Pills constitute a form of medicine very much used in extemporaneous pharmacy, and one with the preparation of which the compounder should be perfectly familiar, for it will constitute fully one-third of his work at the dispensing counter. Pills should not exceed 5 grains in weight, unless the ingredients are very heavy, as Bismuth, Calomel, and Hydrargyrum cum Creta, of

which 6, 8, or 10 grains may be made into a pill which may be readily swallowed. A *Bolus* is a similar mass, but larger than a pill, while the names *Granule* and *Parvule* are given to masses smaller than the average pill.

#### THE PROCESS OF PILL-MAKING.

The Process of Pill-making is briefly as follows: The ingredients ordered in the prescription are separately weighed out in the order of their bulk, commencing with that one of which the smallest quantity is to be used. If any require pulverization they should be placed first in the mortar and reduced to powder, the other dry ingredients added, next the soft extracts and the excipient selected; the whole being worked up into a mass, the *pill-mass*, by the aid of the mortar and pestle. The perfect pill-mass should be uniform throughout, should not show any particles of any one ingredient, should have such a consistence that the pills made from it will retain their shape, should not be too hard, nor too dry, nor should it stick to the fingers. The mortar should be large and shallow, of unpolished wedgewood ware; having a thick, smooth and well-formed bottom and a pestle which fits it. The operation of working up the mass is one of kneading it between the end of the pestle and the side of the mortar, and if proper ingredients and excipient are used and the work is well done, the mass will eventually loosen itself from both mortar and pestle. If it does not do so it should be removed with a spatula when sufficiently worked, and may be kneaded for a few minutes between the fingers. It should then be placed upon the tile or slab previously dusted with a little Lycopodium or Starch in fine powder, and rolled into a long cylinder by the aid of a broad-bladed spatula, until the mass is of a length corresponding to the divisions on the tile-scale which represent the number of pills to be made. The mass should then be placed along the scale, and a cut made through it with the spatula at each division, the pieces being rounded separately into pills by the thumb and two fingers of each hand. A pill-machine is often employed, consisting of two metal plates having semi-cylindrical grooves on one side, set into wooden boards, the whole forming a convenient apparatus for rolling the mass and then cutting it into the required number of pills by one movement. The pills are then left to dry upon the slab while the label is being written, after which they are placed in a pill-box, or in a wide-mouthed bottle if they contain volatile ingredients, and surrounded by a *conspergative* powder (lycopodium, powdered chalk, dusted talc), to prevent their adhering together or losing their shape.

*Excipients* used in pill-making are seldom mentioned in the prescription, but are usually left to the choice of the compounder. Some substances need no excipient, but may be made at once into pills; such being the softer extracts and some gum-resins, the former if too hard only needing a little water, and the latter a few drops of spirit to soften them to the required degree of plasticity. Every druggist has his favorite pill-excipient, many using a paste made of pow-

dered Tragacanth 1, Glycerin  $3\frac{1}{2}$  and Water 1 part, while others use Extract of Malt or a mixture of Syrup and powdered Acacia for general use. Powdered Tragacanth to give tenacity, Glycerin to keep the mass soft, and Water to develop the adhesive qualities of many ingredients, will answer for fully nine-tenths of all the cases which occur in practice. These three excipients should stand on the dispensing counter ready for use, and all ready-made pastes or mixtures should be discarded as being slovenly, dirty and liable to change. The excipients described below are those in general use and are arranged in the order of their comparative importance.

#### LIQUID EXCIPIENTS.

**Glycerin**,—is a very valuable excipient, as it continually attracts moisture from the atmosphere, and pills made from it do not get hard. It should always be used for Quinine pills. *Glycerite of Starch* or *Tragacanth* are generally useful excipients. The former is official, the latter is made in the proportion of 5ss to the ʒ.

**Glucose**,—is a good excipient, being colorless, adhesive, and not readily volatilized at ordinary temperatures. Since its introduction by Mr. Lascheid for this purpose it has steadily grown in favor.

**Honey**,—may be used for dark-colored substances. It should be evaporated to one-half its bulk, and then if mixed with a little Tragacanth it makes an excellent excipient for insoluble powders.

**Extract of Malt**,—is a pretty fair excipient, but has the disadvantage of its dark color.

**Syrup**,—is a fair excipient for powders, but it should not be used for metallic salts, especially Calomel, which it reduces in a short time. *Syrup of Acacia* is good where there is little room left for the excipient, but pills made with it become very hard and insoluble if they are kept long.

**Mucilage of Acacia**,—is very adhesive, but not a good excipient for the same reason as given for the syrup.

**Water**,—is only used alone as an excipient when the ingredients possess sufficient adhesiveness to be developed by the water. Such are the following powders: Aloe, Rhubarb, Kino, Tannic Acid, Opium, Squill, Asafetida,—also Ferric Citrate, Berberine Sulphate, and some other salts.

**Alcohol**,—is used to soften Camphor, Compound Extract of Colocynth, Guaiac, resinous extracts, gums, etc.

#### SOLID EXCIPIENTS.

**Tragacanth**,—is an excellent excipient, especially for substances which are too soft, giving them body and elasticity.

**Acacia**,—is added to give more adhesiveness than can be obtained from viscid liquids alone. Pills made with it are generally very hard. It is used for Silver Nitrate, which may explode if mixed with vegetable extracts or glucose.

**Soap**,—is the best for resinous and fatty substances, increasing the solubility of the former. It should not be used for substances which are decomposed by an alkali, nor for Tartar Emetic.

**Bread-crumbs**, *Mica Panis*,—is an excellent excipient for Croton Oil, or other powerful liquid substances, as volatile oils.

**Confection of Rose**,—is too bulky for general use, but is a good excipient for very active agents like Strychnine, which are used in small quantity.

**Althæa**,—is good for absorbing and adhesive purposes, but is too bulky for general use.

**Petrolatum**, **Cacao Butter**, and **Rosin Cerate**,—are used for oxidizable substances, as Potassium Permanganate.

**Kaolin**,—is well adapted as an excipient for Silver Nitrate and other substances which are easily decomposed.

**Licorice**,—is an old excipient, but not much employed now. In powder it may be used for oils.

*Conspersives* are absorbent powders which are dusted upon the finished pills and put around them in the box or vial in which they are dispensed, to keep them from sticking together and losing their shape. Powdered Licorice was formerly much used for this purpose, but the best *conspersives* are Lycopodium, Talc, Althæa and Rice Flour, the latter especially for white pills.

*Substances suitable* for the pillar form of medicine are—

Those acting in small doses.	Heavy, insoluble substances.
Those intended to act slowly.	Fetid substances.
Those to act on the lower bowel.	Vegetable extracts.
Gums-resins, Balsams, Turpentine.	

When the basis is an unadhesive substance, one of the other ingredients should be an extract or a vegetable powder which will form a mass by moisture alone. Attention to this rule in prescribing pills will often prevent the increase of their size by the use of inert excipients.

*Substances difficult* to combine, except by peculiar treatment, are met with frequently. The following notes will cover most such cases:—

**Aloe**,—is best treated on a heated slab with alcohol in very small quantity. Soap is the excipient in the official *Pilulæ Aloes*.

**Butyl Chloral Hydrate**,—should be treated with a little Confection of Rose and thick mucilage.

**Calcium Sulphide**,—should be well triturated with an equal quantity of Sugar of Milk, and then worked up with a little powdered Licorice-root and Mucilage of Tragacanth.

**Camphor**,—should be powdered with a little alcohol, and may be worked into a pill-mass with Glycerite of Tragacanth after the evaporation of the alcohol.

**Phenol**,—requires nearly an equal part of wheaten flour or bread-crum, with a very minute quantity of Glycerite of Tragacanth. **Creosote** may be made into a mass by the addition of Powdered Licorice with a very little bees' wax. If made into a pill with Silver Oxide it will explode unless the silver salt be first diluted by trituration with Licorice, Gentian, or some other inert powder.

**Iron and Quinine Citrate**,—is very deliquescent with most excipients. Canada Balsam is the best for it.

**Copaiba**,—may be made into a pill-mass by the addition of a little Magnesium Carbonate or Wax.

**Croton Oil**,—is best worked up with bread-crum, though powdered Licorice and Mucilage of Acacia may be used.

**Ferrous Iodide**,—in pill form requires special manipulation and protection to remain unoxidized. The official *Pil. Ferri Iodidi* is prepared with Iodine and Reduced Iron, has Licorice, Sugar, and Acacia as excipients, and is protected by a coating of Balsam of Tolu. In other formulæ, Acacia, Althæa, Cacao-butter, Elm bark, and Licorice are used as excipients.

**Ferrous Sulphate**,—is used in Bland's Pill and in the *Pil. Ferri Compositæ*, with Potassium Carbonate, to form by mutual decomposition Ferrous Carbonate, which quickly passes into the ferric salt by exposure.

**Gallic Acid**,—makes a good pill with a very small quantity of Glycerin. **Tannic Acid** requires about one-fifth its weight of Glycerin and one-tenth of Mucilage.

**Phosphorus**,—presents the problem of combining it in pill without letting it oxidize. This is believed to be accomplished by the pharmacopœial directions for the *Pil. Phosphori*, according to which the Phosphorus is dissolved in Chloroform in a test-tube, then quickly worked into a mass with Althæa, Acacia, Glycerin and Water, and finally the pills are coated by shaking with an Ethereal solution of Balsam of Tolu. Carbon Disulphide is a better solvent, but when it is used the pill-mass retains its disgusting odor.

**Potassium Acetate**,—requires Canada Balsam to secure its stability in pill form. **Potassium Iodide** is best manipulated by rubbing it into a smooth paste with a very little water, then adding a small quantity of Licorice powder. **Potassium Permanganate** should be worked up with Kaolin and a very little water. Rosin Cerate, Soft and Hard Paraffin and Cacao-butter are also used as excipients.

**Quinine**,—requires very clean hands and tools, and a colorless excipient, as Glycerin or Glucose, to make a nice-looking pill. If one part of Tartaric Acid is added to four of the Quinine salt, the mass will be less likely to crumble and will be of less bulk. Quinine Sulphate may be made into small and soluble pills by simply triturating it with Aromatic Sulphuric Acid  $\mathfrak{v}\mathfrak{i}\mathfrak{i}\mathfrak{j}$  to each 5 grains of the salt. The moulding into pills should be done at the moment when the mass has begun to dry. A drop of syrup or honey, added at this time, will prevent the too rapid hardening of the mass.

**Rhubarb**,—in powder makes a good mass with one-fifth of its weight of Glycerin; but Water is the excipient ordered for the official *Pilulæ Rhei Compositæ*.

*Substances unsuited* to the pilular form are—

Those requiring large doses, and those which are volatile.  
Emetics, and other agents administered for immediate effect.  
Essential Oils in quantity exceeding half a drop to each pill.  
Oils and other bodies which require much solid matter to make a mass; except those prescribed in very small dose, as Croton Oil.  
Deliquescent Salts, unless intended to be used immediately.  
Efflorescent Salts, unless deprived of their water of crystallization.

*Deliquescent Salts.*

Ammonii Iodidum.  
—Nitras.  
—Valeras.  
Auri Chloridum.  
Calcii Chloridum.  
Chinolin Salts, except the Tartrate, which is stable.  
Lithii Citras.  
—Bromidum.  
—Salicylas.  
Magnesii Citras.  
Potassii Acetas  
—Carbonas.  
—Citras.  
—Cyanidum.  
—Hydroxidum.  
—Hypophosphis.  
—Sulphis.  
—Tartras.  
Sodii Hypophosphis.  
—Iodidum.  
Zinci Bromidum.  
—Chloridum.  
—Iodidum.

*Efflorescent Salts.*

Alumen (slightly).  
Ammonii Carbonas.  
—Phosphas.  
Antim. et Potassii Tartras (slightly).  
Cupri Acetas.  
—Sulphas.  
Magnesii Sulphas (slightly).  
Potassii et Sodii Tartras (slightly).  
—Ferrocyanidum (slightly).  
Quininæ Bisulphas.  
—Sulphas (after a time).  
Sodii Acetas.  
—Arsenas (slightly).  
—Benzoas.  
—Boras (slightly).  
—Carbonas.  
—Hydroxidum.  
—Hyposulphis.  
—Phosphas.  
—Sulphas.  
—Sulphis.  
Strychninæ Sulphas.  
Zinci Acetas.  
—Sulphas.

*Coated Pills* are manufactured upon a large scale by the great drug houses, extensive machinery being employed for the purpose. The coating material used is either Sugar or Gelatin. The U. S. Pharmacopœia directs that two of the official pills shall be coated by being shaken with a solution of Balsam of Tolu in Ether,—*Pil. Ferri Iodidi* and *Pil. Phosphori*. In extemporaneous pharmacy it is rarely practicable to coat pills with anything except gold or silver leaf, and this is sometimes directed by the prescriber, the word "*Deaurenter*—