

OF THE

# STATE UNIVERSITY.

BULLETIN NO. 150.

# THE PRESERVATION OF DRUGS

LEXINGTON KY, SEPTEMBER 25, 1910.

# Kentucky Agricultural Experiment Station

#### BOARD OF CONTROL.

#### OFFICERS.

RICHARD C. STOLL, Chairman, Lexington, Ky. CHARLES B. NICHOLS, Lexington, Kv. LEWIS L. WALKER, Lancaster, Ky. JAMES G. WHITE, Aoting President of the University. MELVILLE A. SCOVELL, Director, Secretary (In order of appointment.) M. A. SCOVELL, Director and Chemist. A. M. PETER, Chief Chemist, Head of Chemical Division. H. E. CURTIS, Chief Chemist, Head of Fertilizer Division. H. GARMAN. Entomologist and Botanist, Head of Division. R. M. ALLEN, Head of Food and Drug Division. J. D. TURNER Head of Feed Division. J. O. LaBACH, Chief Chemist, Food and Drug Division. MISS M. L. DIDLAKE, Assistant Entomologist and Botanist. S. D. AVERITT, Chemist, Chemical Division. O. M. SHEDD, Chemist, Chemical Division. MISS LILLIE LISTON, Chief Clerk, Food and Drug Division. E. C. VAUGHN, Assistant Entomologist and Botanist. GEORGE ROBERTS. Agronomist. E. S. GOOD, Head of Animal Husbandry Division. J. W. NUTTER, Assistant in Dairying, Animal Husbandry Division. MISS O. L. GINOCHIO, Secretary to the Director. H. D. SPEARS, Chemist, Feed Division. MISS ANNA WALLIS, Stenographer. E. F. WORTHINGTON, Superintendent of Farm. J. W. McFARLIN, Inspector, Food and Drug Division. B. F. SCHERFFIUS, Inspector, Food and Drug Division. K. SCHERTFICE, INSPECTOR, FOOD and DFUg EFVEROR.
MISS KATHERINE T, HOPSON, Stenographer,
E. KINNEY, Assistant Entemologist and Botanist.
WILLIAM C, MATTHEWS, Artist. Division of Entomology and Botany.
T. R. BRYANT, Extension Work.
A. BRONN, D. Comput. Science Scie L. A. BROWN, Drug Chemist, Food and Drug Division, JOHN I. CLAYBROOKE, Inspector. W. R. PINNELL, Inspector, Food and Drug Division. C. S. PORTER, Drug Inspector, Food and Drug Division. B. D. WILSON, Assistant Chemist. Fertilizer Division. D. J. HEALY, Bacteriologist and Microscopist Fooda nd Drug Division. MISS RILLA B. NUTTER, Clerk, Food and Drug Division. H. C. WOOSLEY, Special Agent, U. S. Department of Agriculture.

#### NOTICE.

The Bulletins of the Station will be mailed free to any citizen of Kentucky who sends his name and address to the Station for that purpose.

Correspondents will please notify the Director of changes in their post office address or of any failure to receive bulletins.

Address:

#### KENTUCKY AGRICULTURAL EXPERIMENT STATION.

Lexington, Ky.

## THE PRESERVATION OF DRUGS.

By Linwood A. Brown, Drug Chemist, Food and Drug Division.

One of the most essential branches of Pharmacy is the preservation and keeping of drugs. This has been taught in all our schools and colleges of Pharmacy to a limited extent, but has not received the time, attention and thought that the subject demands.

This subject becomes of vastly greater importance today, because of the unprecedented growth and development in all the contributory sciences to Pharmacy.

Modern organic chemistry is opening a vast field of research, and the thousand and one new synthetic organic compounds and "near" compounds which have flooded the drug market within the last decade, are only a beginning.

Many new drugs, chemicals, preparations, etc., ofttines of a very unstable nature, are constantly being added to the already long list of such now being used by the physician, in his combat with disease, and it is through the druggist's hands that these, as well as the older and more familiar drugs, must reach the consumer in good, no—in perfect condition.

The point which we wish to emphasize in this bulletin, is this—no matter what quality of drugs is bought, nor how carefully a preparation may have been made by the druggist, there is always a possibility of deterioration, change of strength, and loss of medicinal properties, unless the drug has been properly kept, stored or handled.

The Pharmacopoeia in a great many instances, states the proper care that should be given to such, in order to preserve the strength and quality of the preparation. But the druggist himself must make use of his ingenuity and the experience of others, as reported in the different drug journals, in the keeping and handling of a large number of preparations not mentioned in the Pharmacopoeia or National Formulary.

It is the object of this bulletin to suggest and discuss means

#### Bulletin No. 150.

of preserving and keeping drugs which are liable to deteriorate or spoil, and to thus aid the druggist in complying with the provisions of the drug law.

The public is gradually awakening to the fact that it can have pure drugs, and has caused to be passed such laws as will secure the needed results.

The passage and subsequent enforcement of the Federal Food and Drugs Act of June 30, 1906, have so plainly shown the need of such control, that almost every state in the Union has either adopted the Federal Act or has passed laws in close agreement with it.

The Kentucky Food and Drugs Act of March 13th, 1908, defines a drug as follows :---

"Sec. 5. That the term drug, as used in this act, shall include all medicines and preparations recognized in the latest revisions of the United States Pharmacopoeia or National Formulary, for internal or external use, and any substance intended to be used for the cure, mitigation or prevention of diseases, either of man or other animal, and shall include paris green and all other insecticides and fungicides."

This clearly defines what is meant by the term drug, and the law states further, in Section 6:

"That for the purpose of this act, an article of drug shall be deemed to be adulterated:

First. If, when a drug is sold under or by the name recognized in the United States Pharmacopoeia or National Formulary, it differs from the standard of strength, quality or purity, (italics added) as determined by the tests laid down in the United States Pharmacopoeia or National Formulary official at the time of investigation.

Provided, That no drug defined in the United States Pharmacopoeia or National Formulary shall be deemed to be adulterated under this provision if the standard of strength, quality or purity be plainly stated upon the bottle, box, or other container thereof, although the standard may differ from that made by the test laid down in the United States Pharmacopoeia or National Formulary.

Second. If the strength or purity fall below the professed standard of quality under which it is sold."

This plainly shows that drugs, when sold in Kentucky, must conform to the Pharmacopoeia, or, if not, their strength or

purity must be plainly stated on the label. This point has been explained more fully in regulations gotten out by representatives of the Kentucky Medical Association, Kentucky Pharmaceutical Association, and the Director of the Experiment Station as provided in the law.

In order to present such a diversified subject in as clear and concise a manner as possible, we have divided the subject into four groups which will be taken up for discussion, in the order here given.

First—Crude Drugs. Second—Chemicals. Third—Preparations. Fourth—Miscellaneous Drugs.

#### PART I-CRUDE DRUGS.

Most crude drugs when received by the druggist in a modern drug store are very seldom in the form in which they are picked or collected, but have passed through the hands of the drug miller and reach the druggist usually in powdered form, ready for percolation or maceration, or other form in which the drug is to be used, although there is a number of crude drugs handled by the druggist, which have not been ground, such as spices, rhubarb, cardamom, compressed herbs, etc.

Many crude drugs when gathered contain a large amount of moisture, varying anywhere from 5 to 80% of the weight, and in order to preserve them and to facilitate comminution, they must be dried, and, owing to their porous nature, are very prone to reabsorb moisture and become mouldy.

The practice of keeping crude vegetable drugs in cardboard or paper containers, or in open drawers, in drug stores, is not good practice, as a great many of them depend for their medicinal properties upon the presence of volatile principles, and when so kept, rapidly lose a considerable portion of such constituents in the hot dry atmosphere of the average drug store. Ofttimes such drugs, when kept in this manner, are stored near a stove or radiator during the winter months, and subjected to its direct heat.

Such drugs should be placed as soon as received, in japanned tin boxes provided with removable labels, and so arranged that odorless drugs will not be kept in close proximity to those possessing strongly odoriferous principles, thus preventing contamination.

The boxes containing such drugs should be kept in a cool, dry place in the store room, and only sufficient quantity taken from them and kept in the store to supply the immediate counter trade.

Some crude drugs are especially liable to attack from insects, and the insect that is liable to attack some particular drug will depend to a large extent on the nature of the drug, and the physical characteristics of the insect.

The insects most injurious to crude drugs are those provided with strong jaws for biting, and in this class may be cited the mites, many kinds of beetles, and some insects that are injurious in the larva stage.

The mites are small, round, oval insects with eight legs, and the mouth is provided with a beak. There are many species of the mite: some being known as sugar mites, cheese mites, etc.

Cantharides are often attacked by a mite belonging to the genera Glyciphagus. The presence of this pest may be known by the formation of a considerable amount of dust and broken fragments collecting at the bottom of the jar, and by careful examination small whitish objects may be seen moving about in the powder.

Prof. Sayre of the University of Kansas, reports having found a small beetle, Satodrepa panices, feeding on columbo, aconite, mustard, althea, belladonna, poke root, ginseng, angelica, etc.

Ergot, belladonna root, musk root, powdered senna, powdered jaborandi leaves, sweet almonds, etc., are attacked by species of this same family (Plinidae).

A large number of other drugs is attacked by some form of insects, and large quantities are damaged to such a degree as to prevent their use in pharmaceutical preparations.

Drugs liable to be infected with such insects should be treated with the vapors of carbon bisulphide, chloroform, etc., by placing in tight boxes and placing a wad of cotton, or a sponge, saturated with the remedy to be used, in it, and closing tightly and allowing to stand for about twenty-four hours, until the vapors have had time to thoroughly penetrate the drug, after which encouse to air write free form vapors

#### The Preservation of Drugs.

Sunlight is also valuable to prevent the growth and destructive action of such insects.

The Pharmacopoeia gives but few specific directions for the keeping of crude drugs, the following being the only instances found.

#### Ergot.

"Should be moderately dried, and not exposed to a damp atmosphere. After being kept for more than a year, it is unfit for use."—U. S. P.

#### Chrysarobin.

"Should be preserved in amber colored, glass stoppered vials."-U. S. P.

#### Conium.

"If kept for more than two years, is unfit for use."-U. S. P.

#### Camphor.

Owing to its ready volatility, camphor "should be kept in well closed vessels, in a cool place."-U. S. P.

#### Columbo.

Should be thoroughly dried and kept in a dry place. Should be closely watched for insects, as it is liable to be attacked, if kept for any length of time.

#### Capsicum.

This drug depends upon its oleoresin for its medicinal properties, and should be kept in well closed containers, in a cool dry place.

#### Cloves.

Should be kept in well closed containers, in a cool dry place.

#### Digitalis.

Digitalis should be kept in air tight containers, and in the dark. It has been recommended that it be kept over unslaked lime.

#### Belladonna Root.

Is very apt to be attacked by insects, unless closely watched.

#### PART II—CHEMICALS.

Many chemicals contain water of crystallization and are prone to effloresce and give off a part of the water of crystallization, the crystals becoming opaque and unsightly and eventually falling to a powder. Good examples of this are magnesium sulphate, sodium carbonate, Rochelle salts, sodium arsenate, sodium phosphate, zinc sulphate, etc. This is a distinct monetary loss to the druggist, as well as being liable to cause him trouble when such substances are used in preparation of medicines, for the quantities as called for in the Pharmacopoeia are intended to be of U. S. P. composition, which, in the case of crystalline compounds containing water of crystallization, are expected to contain definite amounts of water of crystallization.

Some, on the other hand, absorb moisture and become entirely liquified, depending upon the nature of the drug, and extent of exposure. Scale pepsin, potassium acetate, sodium and potassium hydroxides, potassium carbonate, granular effervescent powders, etc., while some liquids like glycerin, sulphuric acid, absolute alcohol, and to a lesser extent, alcohol, are hygroscopic, and become reduced in strength or otherwise unfit for pharmaceutical use.

Again, some chemicals are readily affected by the chemical or actinic rays of light, and by exposure to the air are oxidized, or in the case of some very unstable compound, are reduced by contact with organic bodies. Silver, gold, platinum, and mercury salts, are readily reduced or changed by the action of light, or contact with organic substances, also some organic compounds are similarly affected, such as resorvingl, quinine subphate, santonin, some alkaloids, etc.

Potassium chlorate, nitrate, and permanganate, sulphur, silver oxide, hypophosphites, etc., are so readily affected by contact with organic bodies, that there is always a possibility of an explosion or spontaneous ignition, resulting in disastrous consequences.

Ferrous sulphate, hydriodic acid and its preparations, sul phurous acid, pyrogallic acid, benzaldehyde, oil of bitter almonds, oil of lemon, oil of orange, etc., are apt to absorb oxygen from the air and become deteriorated, while a number of drugs, such as Goulard's extract, lime water, sodium and

#### The Preservation of Drugs.

potassium hydroxides, ammonia, etc., greedily absorb carbon dioxide on exposure to the air, and are rendered unsightly or unfit for use.

Therefore, in view of the above mentioned facts, the druggist should give particular care to the storing and handling of this class of drugs, if he expects to dispense chemicals of U.S. P. strength and potency.

The following is an itemized list of those drugs liable to be affected as mentioned above, with some suggested means of keeping and storing same.

#### Benzoic Acid.

Owing to the fact that this acid is distinctly volatile, at ordinary room temperatures, and that it is affected by light, turning darker, the Pharmacopoeia has directed that "it should be kept in dark, amber colored, well stoppered bottles, in a cool place."

#### Dilute Hydriodic Acid.

Dilute Hydrobromic Acid.

Both of these acids are of a very unstable nature, and when freshly prepared, should be colorless, odorless, liquids, which on exposure to light and air become discolored, liberating iodine or bromine, as the case may be. For this reason, the Pharmacopoeia directs that they shall "be kept in amber colored, glass stoppered bottles, protected from the light."

#### Dilute Hydrocyanic Acid.

This is another very unstable acid, which is very apt to decompose, forming ammonium formate, earbon dioxide, cyanic acid, and paracyanogen, a polymer of cyanogen, which deposits as a brownish precipitate. It is not known exactly why this change takes place, but the presence of acids or alkali, and the action of light, tend to promote these changes. It should be kept in a cool place, as the acid is quite volatile, and is very apt to fall below the required strength of 2%. "It should be kept in small, dark amber colored, cork stoppered vials, in a cool place." -U. S. P.

#### Bulletin No. 150.

#### Hydrochloric Acid.

Dilute Hydrochloric Acid.

#### "Should be kept in glass stoppered bottles."-U. S. P.

#### Nitric Acid—Concentrated and Dilute.

Nitric acid is a powerful oxidizing agent, acting violently on almost all organic compounds. It is decomposed by direct or diffused sunlight, becoming brownish in color, due to liberated oxides of nitrogen. For this reason "it should be kept in glass stoppered bottles."— U. S. P. And as a further precaution, should be kept in dark closets, and in a cool place.

#### Nitro Hydrochloric Acid.

Owing to the fact that time must be allowed for this reaction to complete itself, this acid should never be made extemporaneously. It should contain in solution, both free chlorine and nitrosyl chloride, and for this reason it should be kept in "dark amber colored, glass stoppered bottles, which should not be more than half filled, and which should be kept in a cool place."—U. S. P. If bottles are filled too full, the gases which are liberated for some time, may produce pressure enough to burst bottles.

#### Dilute Nitro Hydrochloric Acid.

The nitrosyl chloride found in nitro hydrochloric acid, is decomposed into hydrochloric and nitrous acid by the water used in this preparation. The U. S. P. directs that this "be kept in dark amber colored, glass stoppered bottles, in a cool place. It should not be dispensed unless recently prepared."

#### Phosphoric Acid, Sulphuric Acid and Aromatic Sulphuric Acid.

"Should be kept in glass stoppered bottles."-U. S. P.

#### Sulphurous Acid.

Is a solution of sulphur dioxide in water, and when exposed to air, is readily oxidized to sulphuric acid, and loses part of its sulphur dioxide by volatilization. Light also affects it, reducing it to hydrogen sulphide. For this

reason "it should be kept in dark amber colored, glass stoppered bottles, and kept in a cool place, protected from light."—U. S. P. (It should not be dispensed unless full strength.)

#### Trichloracetic Acid.

This acid is volatile at room temperature, and is very deliquescent. "Should be kept in dark amber colored, well stoppered bottles, in a cool place."—U. S. P.

#### Ammonium Benzoate.

"Should be kept in well stoppered bottles."-U. S. P.

#### Ammonium Bromide.

This salt frequently turns dark when exposed to light, which is believed to be due to small amounts of iron present. The Pharmacopoeia directs that "it should be kept in well stoppered bottles," and it no doubt would be better to keep in a dark place.

#### Ammonium Carbonate.

Ammonium carbonate, when exposed to the air, gives off vapors of ammonia and carbon dioxide, leaving a residue of ammonium bicarbonate, a white powder. "Should be kept in well stoppered bottles, in a cool place. For dispensing purposes, only the translucent portion should be used."—U. S. P.

#### Ammonium Iodide.

This salt is very deliquescent, and frequently turns yellow, due to liberated iodine, which may be prevented by the careful addition of a few drops of spirit of ammonia. The U. S. P. directs that this salt "should be kept in small, amber colored, well stoppered vials, protected from light."

#### Ammonium Salicylate.

"Should be kept in well stoppered bottles, protected from heat and light."—U. S. P.

#### Ammonium Valerate.

Slightly efflorescent in very dry air, such as in drug stores, but deliquescent upon coming in contact with moist air. "Should be kept in well stoppered bottles." --U. S. P. Silver Cyanide. Silver Nitrate. Silver Nitrate moulded. Silver Nitrate mitigated. Silver Oxide.

These salts of silver, as is true of practically all silver salts, are quite readily affected by light, turning brown or black, or by coming in contact with organic matter, which reduces them to metallic silver, rendering them unfit for the use to which they are intended. The U S. P. directs in each case that they "should be kept in dark amber colored vials, (glass stoppered is best) protected from light."

#### Arsenous Iodide.

This salt is quite readily decomposed, and should be carefully protected from heat, light, and air.

The U. S. P. states that "it should be kept in amber colored, glass stoppered vials, in  $\varepsilon$  cool place, carefully protected from light."

#### Gold and Sodium Chloride.

This mixture is slightly deliquescent, and the gold chloride is reduced by light, hence "should be kept in amber colored, well stoppered vials."-U. S. P.

#### Bismuth and Ammonium Citrate.

"Keep the product in amber colored, well stoppered bottles, protected from light."-U. S. P.

#### Benzaldehyde.

This substance greedily absorbs oxygen from the air, forming a precipitate of benzoic acid in the bottle, and unless tightly stoppered, the entire contents of the bottle will soon become solid.

"Should be kept in small amber colored, well stoppered bottles."-U. S. P.

#### Calcium Bromide and Chloride.

The great difficulty in keeping these two salts, is on account of their extreme deliquescence, soon absorbing

moisture enough from the air to liquify. The bottles should be stoppered with good sound corks, and coated with a layer of parafin, which should be sealed with a hot spatula each time they are opened. The U. S. P. directs that they "should be kept in well stoppered bottles."

#### Calcium Hypophosphite.

"Should be kept in well stoppered bottles"—U. S. P. to protect it from moisture, and the air, which causes it to oxidize to the phosphate.

#### Exsiccated Calcium Sulphate.

Plaster of paris is used almost entirely in medicine as a dressing or plaster casts, and unless well protected from moisture, will not "set." The common practice of keeping it in boxes or drawers, is gross carelessness.

"Should be kept in well closed vessels, carefully protected from moisture."-U. S. P.

#### Calx or Lime.

As is well known, lime is readily converted into "slaked lime" on exposure to air, forming a mixture of hydrate and carbonate of lime. Only unslaked lime should be used in preparing Liquor Calcis.

"Should be kept in well closed vessels, in a dry place." --U. S. P.

#### Chlorinated Lime.

This compound is readily decomposed on exposure to air and moisture, giving off an odor of chlorine or hypochlorous acid, and absorbing  $CO^2$  from the air which combines with the base to form calcium carbonate.

Instances have been known of violent explosions taking place even when kept in well stoppered bottles (A. J. P. 1861, p. 72).

The U. S. P. directs that it "should be kept in well closed vessels, in a cool and dry place."

#### Sulphurated Lime.

This preparation should be kept protected from air

and moisture to prevent oxidation of the sulphide to sulphate, and in order to comply with the Pharmacopoeia, "should contain at least 55% of calcium sulphide."

#### Chloralformamide.

"Should be kept in amber colored, well stoppered vials." U. S. P. Owing to its volatility, it should be kept in a cool place.

#### Chloral Hydrate.

Is quite readily volatile at ordinary temperature of a drug store, and its aqueous solution rapidly decomposes, which is greatly hastened by the presence of alkaline substances. "It should be kept in glass stoppered bottles, in a cool and dark place."—U. S. P.

Amber colored bottles are preferred.

#### Chromium Trioxide.

Great care should be used in handling and storing ehromium trioxide, as it is very deliquescent, and when brought in contact with organic substances, decomposition takes place, often with great violence.

"Should be kept in glass stoppered bottles, and great caution should be observed to avoid bringing it in contact with organic substances, such as cork, tannic acid, sugar, alcohol, collodion, etc., as serious accidents are liable to result."—U. S. P.

#### Cinnamic Aldehyde.

"Should be kept in small, amber colored, well stoppered bottles."—U. S. P.

#### Lead Plaster.

#### Ferric Chloride.

Is very deliquescent, and sunlight has the property of reducing it to the ferrous state, therefore the U. S. P. directs to "keep in glass stoppered bottles, protected from light."

#### Ferric Citrate.

"Keep in well stoppered bottles, protected from light." U. S. P.

Iron and Ammonium Citrate.

Iron and Ammonium Sulphate.

Iron and Ammonium Tartrate.

Iron and Potassium Tartrate.

Iron and Quinine Citrate.

Soluble Iron and Quinine Citrate.

Iron and Strychnine Citrate.

Soluble Ferric Phosphate.

Soluble Ferric Pyro-Phosphate.

"Should be kept in well stoppered bottles, protected from light."—U. S. P.

#### Ferrous Sulphate.

This salt crystallizes with seven molecules of water, a portion of which is given up on exposure to the air; it also absorbs oxygen from the air, causing the crystals to become coated with a layer of basic sulphate. The crystals appear to keep better, if crystallized from a slightly acid solution.

The U. S. P. directs that it "should be kept in well stoppered bottles."

#### Exsiccated and Granulated Ferrous Sulphate.

"Should be kept in perfectly dry, well stoppered bottles."-U. S. P.

#### Reduced Iron.

Owing to the finely divided state of this substance, it is very prone to oxidation, and hence should be kept in tightly stoppered bottles, in order to preserve the required strength of metallic iron.

#### Guaiacol.

Guaiacol is discolored when exposed to the light, becoming brownish, therefore the U. S. P. directs that it "should be preserved in amber colored bottles, protected from light."

#### Hexamethylenamine.

"Should be kept in well stoppered bottles."-U. S. P.

#### Mercuric Chloride.

"Should be kept in well stoppered bottles."-U. S. P.

#### Calomel.

This salt is of a white or yellowish white color, depending on the process used in making it. Light has the property of reducing it to Hg, with the formation of mercuric chloride, according to the following reaction:

2 Hg Cl + light=Hg + Hg Cl<sup>2</sup>.

The U. S. P. directs that it "should be kept in dark amber colored bottles."

#### Yellow Mercurous Iodide.

For the same reason as given under calomel, it "should be kept in dark, amber colored vials, with the least possible exposure to light."

#### Red Mercuric Iodide.

Yellow Mercuric Oxide.

Red Murcuric Oxide.

Ammoniated Mercury.

Mercury with Chalk.

"Should be kept in well stoppered bottles, protected from light."—U. S. P.

#### Iodoform.

"Should be kept in amber colored bottles, in a cool and dark place."-U. S. P.

#### Iodol.

"Should be kept in amber colored bottles, protected from light."--U. S. P.

#### Iodine.

"Should be kept in glass stoppered bottles, in a cool place."-U. S. P.

Lithium Benzoate.

Lithium Bromide.

Lithium Carbonate.

Lithium Citrate.

Effervescent Lithium Citrate.

Lithium Salicylate.

"Should be kept in well stoppered bottles."-U. S. P.

#### Magnesium Oxide.

Slowly absorbs moisture and carbon dioxide, on exposure to the air, and hence "should be kept in well closed vessels." ----U. S. P.

#### Magnesium Sulphate.

This salt should contain seven molecules of water of crystallization, in order to meet the requirements of the U. S. P.

As ordinarily kept by druggists in barrels, boxes, etc., without any precaution, it loses one molecule of water, forming a white powder, a loss of sbeut 8% in weight.

"Should be kept in well closed vessels."-U. S. P.

#### Effervescent Magnesium Sulphate.

"Should be kept in well stoppered bottles."-U. S. P.

#### Manganese Hypophosphite.

#### Manganese Sulphate.

"Should be kept in well stoppered bottles."-U. S. P.

#### Menthol.

Owing to the volatile nature of this substance, it "should be kept in well stoppered bottles, in a cool place."-U. S. P.

#### Naphthalene.

This substance turns brown on exposure to light, and is volatile at ordinary temperature, hence "should be kept in well stoppered, amber colored bottles."—U. S. P.

#### Pepsin.

#### Pancreatin.

Both of these animal ferments are slightly hygroscopic, and should be kept in well closed vessels, and in a cool place. Neither should have a disagreeable ordor.

It has been definitely shown by a number of investi-

gators, that pepsin and pancreatin destroy each other when in solution.

#### Phenol Salicylate (Salol).

Owing to its low melting point, and ready volatilization, it should be kept in well stoppered bottles, in a cool place.

#### Lead Acetate.

This salt should contain 99.5% of pure lead acetate [Pb ( $O^2 H^3 O^2$ ) <sup>2</sup> 3 H<sup>2</sup> O] in order to conform to the U. S. P. requirements, and owing to the facility with which it absorbs  $OO^2$  and gives up its water of crystallization, it "should be kept in well stoppered bottles."U. S. P.

#### Lead Iodide.

"Should be kept in well stoppered bottles, protected from light."-U. S. P.

Lead Nitrate.

Lead Oxide.

"Should be kept in well closed vessels."-U. S. P.

Potassium Acetate.

Potassium Bicarbonate.

Potassium Bitartrate.

Potassium Bromide.

Potassium Carbonate.

Potassium Chlorate.

Potassium Citrate.

Potassium Citrate Effervescent.

Potassium Cyanide.

Potassium Dichromate.

Potassium and Sodium Tartrate.

Potassium Ferro-cyanide.

Potassium Hypophosphite.

Potassium Iodide.

Potassium Nitrate.

"Should be kept in well stoppered bottles."-U. S. P.

#### Potassium Hydroxide.

This substance is extremely deliquescent and absorbs  $\rm CO^2$  with avidity, and should be kept in bottles made of hard glass, to prevent the action of the alkali on the glass.

The cork should be sealed over with a layer of paraffin,

and each time the bottle is opened, should be resealed by means of a hot spatula.

The U. S. P. directs that it "should be kept in well stoppered bottles, made of hard glass."

#### Potassium Permanganate.

The unstable nature of this substance is so well known, that a word of caution as to the handling of it should be unnecessary.

The U. S. P. directs that it "should be kept in glass stoppered bottles, protected from light. Potassium permanganate when in concentrated solution, or in the dry condition, should not be brought in contact with organic or other readily oxidizable substances."

#### Pyrogallol.

#### Pyroxylin.

Unless well washed, this compound seems to be prone to decomposition, which appears to be accelerated by light.

The U. S. P. directs it to be "kept in cartons protected from light."

#### Resorcinol.

Acquires a pink to dark reddish color on exposure to light, hence "should be kept in dark amber colored vials." --U. S. P.

#### Santonin.

When exposed to light for any length of time, it turns yellow, and hence should be kept in a dark place.

"According to Sestini, the santonin is changed into formic acid, and an uncrystallizable substance, much more soluble in alcohol than santonin itself, which he calls photosantonic acid, and a resinous substance."---U. S. Disp.

The yellow crystals may be obtained pure by recrystallization from alcohol.

"Should be kept in dark, amber colored vials, and in a dark place."-U. S. P.

Salicin.

"Should be kept in well stoppered bottles."-U. S. P.

Sodium Acetate. Sodium Arsenate. Sodium Benzoate. Sodium Borate.

Soaium Borate.

Sodium Bromide.

Sodium Chlorate.

Sodium Citrate.

Sodium Hypophosphite.

Sodium Iodide.

Sodium Nitrate.

Sodium Nitrite.

Sodium Phenol Sulphonate.

Sodium Phosphate Effervescent.

Sodium Phosphate-Exsiccated.

Sodium Pyrophosphate.

Sodium Thiosulphate.

"Should be kept in well stoppered bottles."-U. S. P.

Sodium Arsenate-Exsiccated.

"Should be kept in dry, well stoppered bottles."-U. S. P.

#### Sodium Bicarbonate.

This salt begins to lose carbon dioxide, and is converted into the normal carbonate, if exposed to air, or stored in a warm place.

"Should be kept in well closed vessels, in a cool place." ---U. S. P.

#### Sodium Bisulphite.

When exposed to air, it loses sulphur dioxide and is oxidized to the sulphate, hence "should be kept in a cool place, in small, completely filled, well stoppered bottles." --U. S. P.

#### Sodium Carbonate-Monohydrated.

This is the only official sodium carbonate and is the one that should be used in all pharmaceutical work. The com-

mercial sodium carbonate contains ten molecules of water, a portion of which it rapidly loses on exposure to air.

The official salt should be kept in well stoppered bottles.

#### Sodium Hydroxide.

"Should be kept in well stoppered bottles, made of hard glass."-U. S. P.

See comment on Potassium Hydroxide.

#### Sodium Phosphate.

This should contain twelve molecules of water of crystallization, in order to conform to the U. S. P. It loses five molecules on exposure to air, forming a white powder.

"Should be kept in well stoppered bottles, in a cool place."-U. S. P.

#### Sodium Salicylate.

"Should be kept in well stoppered bottles, protected from heat and light."-U. S. P.

#### Sodium Sulphate.

"Should be kept in well closed vessels, in a cool place." --U. S. P.

#### Sodium Sulphite.

"Should be kept in well stoppered bottles, in a cool place."-U. S. P.

#### Strontium Bromide.

Very deliquescent in moist air, becoming liquified and unfit for use.

"Should be kept in glass stoppered bottles."-U. S. P.

#### Strontium Iodide.

"Should be kept in small, glass stoppered vials, carefully protected from light."-U. S. P.

Light and air cause this chemical to become yellow.

#### Strontium Salicylate.

"Should be kept in well stoppered bottles, protected from heat and light."-U. S. P.

Sulphonal. Trional. "Should be preserved in well stoppered vials."—U. S. P.

#### Washed Sulphur.

Precipitated Sulphur.

"Should be kept in well stoppered bottles."-U. S. P.

#### Sulphur Iodide.

On exposure to the air, this salt loses iodine, hence "should be kept in glass stoppered bottles, in a cool place." --U. S. P.

#### Terpin Hydrate.

"Should be kept in well stoppered bottles."-U. S. P.

#### Terebene.

"Should be kept in well stoppered bottles, in a cool place, protected from light."—U. S. P.

#### Thymol Iodide (Aristol).

"Should be kept in amber colored vials, protected from light."-U. S. P.

## Zinc Acetate.

Zinc Sulphate.

"Should be kept in well stoppered bottles."-U. S. P.

#### Zinc Bromide.

Zinc Chloride.

#### Zinc Phenol Sulphonate.

Zinc Valerate.

#### Zinc Iodide.

"Should be kept in small, glass stoppered bottles, protected from light"-U.S. P

#### INFLAMMABLE AND EXPLOSIVE BODIES.

In the storage of liquids of an inflammable nature, great care should be taken to prevent loss by evaporation, which if near a fire, may give rise to an explosion.

#### Acetone.

"Should be kept in well closed vessels, in a cool place, remote from lights or fire."—U. S. P.

#### Ether.

"Should be kept in partially filled (to relieve pressure), well stoppered containers, preferably tin cans, in a cool place, remote from lights or fire."—U. S. P.

#### Acetic Ether.

"It should be kept in well stoppered bottles, in a cool and dark place, remote from lights or fire."—U. S. P.

#### Ethyl Chloride.

"On account of its extreme volatility, it should be preserved in hermetically sealed glass tubes, and kept in a cool place, remote from lights or fire."—U. S. P.

#### Alcohol.

"Should be kept in well closed vessels, in a *cool* place, remote from lights or fire."-U. S. P.

Commercial alcohol is seldom of the purity and strength necessary for pharmaceutical use, averaging as a rule, from 88% to 92%, and containing large amounts of aldehydes, fusel oil constituents, coloring matter, and tannin.

Even the best of alcohol, as has been found in this laboratory, will soon become contaminated with coloring matter and tannin, if stored in barrels. It is much better to keep alcohol in glass or tin, as it keeps its strength better, does not absorb coloring matter, etc., and does not so readily develop an acid reaction, due to the oxidation of the aldehydes present. The varieties of alcohol known as "silent spirits," "cologne spirits," or "velvet spirits," are usually very pure and conform to the requirements of the Pharmacopoeia for strength as well as absence of impurities.

#### Absolute Alcohol.

"It should be kept in well stoppered bottles, or tin cans, in a cool place, remote from lights or fire."—U. S. P.

#### Dilute Alcohol.

"Should be kept in well closed vessels, in a cool place, remote from lights or fire."-U. S. P.

#### Petroleum Benzin.

"Should be carefully kept in well stoppered bottles, or tin cans, in a cool place, remote from lights or fire."— U. S. P.

#### Collodion.

Styptic Collodion. Flexible Collodion. Cantharidal Collodion.

"Keep in well corked and sealed bottles, in a cool place, remote from lights or fire."-U. S. P.

#### Spirit Nitro Glycerin.

"Should be kept and transported in well stoppered tin cans, and should be stored in a cool place, remote from lights or fire."—U. S. P.

#### Spirit Nitrous Ether.

"Keep in small, well stoppered, dark amber colored vials, in a cool place, remote from lights or fire."-U. S. P.

#### Spirit Ether and Compound Spirit Ether.

No directions are given by the Pharmacopoeia, but owing to the volatile and inflammable nature of these preparations, they should be kept in medium sized, well stoppered bottles, and in a cool place.

#### Amyl Nitrite.

"Should be kept in hermetically sealed glass bulbs, or in dark amber colored, glass stoppered vials, in a cool and dark place."—U. S. P.

#### Carbon Bisulphide.

"Should be kept in partially filled, well stoppered bottles, or in tin cans, in a cool place, remote from lights or fire."—U. S. P.

#### Phosphorous.

"Should be carefully kept under water, in strong, well closed vessels, in a secure and moderately cool place, protected from light."-U. S. P.

#### MISCELLANEOUS LIQUIDS.

#### Chloroform.

When used for anaesthetic purposes, it should be perfectly free from chlorinated and other decomposition products, as such impurities increase its toxicity when used to produce anaesthesia.

Light rapidly decomposes chloroform.

"Should be kept in dark amber colored, glass stoppered bottles, in a cool and dark place."-U. S. P.

#### Bromoform.

"Should be kept in dark amber colored, glass stoppered bottles, in a cool place, protected from light."-U. S. P.

#### Bromine.

"It should be kept in protected glass stoppered bottles, in a cool place."-U. S. P.

#### Phenol.

Crystallized phenol absorbs moisture if exposed to a damp atmosphere, and liquifies, is readily volatile, and both the crystallized and liquified become red on exposure to light.

"Should be kept in dark, amber colored, well stoppered bottles,"-U. S. P.

#### Paraldehyde.

"Should be kept in well stoppered, dark amber colored bottles, in a cool place."-U. S. P.

#### Cresol.

"Should be preserved in amber colored bottles, protected from the light."-U. S. P.

#### Methyl Salicylate.

"Should be kept in well stoppered bottles, protected from light."-U. S. P.

#### Etherial Oil.

"Keep in small glass stoppered vials, in a cool place." ----U. S. P.

#### Turpentine.

When freshly distilled, it is free from offensive odor, but on exposure to air, and to a greater extent if exposed to light, it becomes yellowish and develops a strong odor, with the formation of a resinous substance.

"Should be kept in well stoppered bottles."-U. S. P.

#### Rectified Oil Turpentine.

"Should be kept in well stoppered, amber colored bottles, in a cool place."-U. S. P.

#### ALKALOIDS, ALKALOIDAL SALTS, GLUCOSIDES, Etc.

Alkaloids as a rule, are very stable bodies, though some are readily affected by light, alkalies, etc. None such should be dispensed if discolored to any extent.

#### Aconitine.

"Should be kept in amber colored, well stoppered vials." ---U. S. P.

#### Atropine.

"Should be kept in amber colored, well stoppered vials." ----U. S. P.

Codeine.

Codeine Phosphate. Codeine Sulphate. Colchicine. "Should be kept in well stoppered, amber colored vials." U. S. P.

#### Homatropine Hydrobromide.

"Should be kept in well stoppered vials, protected from light."-U. S. P.

Hydrastine.

Hydrastinine Hydrochloride.

"Should be kept in well stoppered bottles."-U. S. P.

Hyoscine Hydrobromide.

Hyoscyamine Hydrobromide.

Hyoscyamine Sulphate.

"Should be kept in well stoppered, amber colored vials." U. S. P.

#### Morphine Acetate.

This salt gives off acetic acid, and is converted into the insoluble alkaloid, especially if the bottle contains alkali, as some cheap glassware is liable to do.

"Should be kept in well stoppered, dark amber colored vials. A minute quanity of free acetic acid should be present to prevent decomposition."—U. S. P.

#### Morphine Hydrochloride.

Morphine Sulphate.

"Should be kept in well stoppered, amber colored vials." --U. S. P.

#### Quinine.

Quinine Bisulphate.

Quinine Hydrobromide.

Quinine Hydrochloride.

Quinine Salicylate.

"Should be kept in well stoppered, (dark) amber colored vials."-U. S. P. Quinine Sulphate.

Should contain seven molecules of water of crystallization, which it rapidly loses on exposure to air. It also turns brown if unduly exposed to light.

"Should be kept in well stoppered bottles, preferably of an amber color, and in dark place."—U. S. P.

Tin cans with tightly fitting covers, serve the purpose admirably.

#### Apo-Morphine Hydrochloride.

Is easily affected by light, acquiring a greenish color, forming an emerald green colored solution. It should never be used in this condition.

Alkalies promote this change, and for this reason the bottles should be rinsed out with dilute hydrochloric acid before filling.

"Should be kept in small, dark amber colored vials, which have been previously rinsed with dilute hydrochloric acid, and dried."—U. S. P.

Strychnine Nitrate.

Strychnine Sulphate.

"Should be kept in well stoppered vials."-U. S. P.

#### Pelletierine Tannate.

Physostigmine Salicylate.

Physostigmine Sulphate.

Pilocarpine Hydrochloride.

Pilocarpine Nitrate.

"Should be kept in small, dark amber colored, well stoppered vials."-U. S. P.

Veratrine.

"Should be kept in well stoppered, amber colored vials." --U. S. P.

#### PART III-PREPARATIONS, ETC.

The storing and preservation of galenical preparations require greater care and judgment than almost anything else that comes under the purvey of this bulletin. In the case of chemicals, etc., we are dealing with substances of a definite composition usually, but in the case of preparations of the U. S. P., N. F., and unofficial preparations, we have a more complex proposition to deal with, inasmuch as they may contain anywhere from two to ten or fifteen incredients to be taken into consideration.

#### Ammonia Water.

This is a solution of ammonia gas in water, and at ordinary temperature rapidly loses ammonia gas. If the temperature is allowed to rise too high, enough pressure may be generated in the container to cause it to burst.

Cork stoppers discolor ammoniacat liquids, causing them to become brownish.

"It must not be dispensed for medicinal purposes if it contains less than 10% by weight, of the gas. Should be kept in glass stoppered bottles, in a cool place."—U. S. P.

#### Stronger Ammonia Water.

"Should be kept in partly filled, strong, glass stoppered bottles, in a cool place. Great caution should be used in handling this liquid."—U. S. P.

#### Stronger Orange Flower Water.

#### Stronger Rose Water.

"Should be kept in bottles loosely stoppered with a pledget of purified cotton, and in a dark place."-U. S. P.

It is a peculiar fact that preparations of this kind rapidly lose their fragrance, and become musty and stale, if kept in tightly stoppered bottles: however, on removing the stopper, and covering with cloth or cotton, to keep out dust, they soon regain their former fragrance.

These two preparations, as well as others of this nature, sometimes develop fungus growth, or become thick and mucilaginous. It is possible that this could be prevented to a large extent, by a process of pasturization, by heating to a temperature of 75 to 80°C, for one hour, for three consecutive days, and then stoppering with a plug of cotton.

#### Distilled Water.

This is the only water that should be used in the manufacture of preparations, or in prescription practice.

"Keep in glass stoppered bottles, which have been rinsed with hot distilled water immediately before being filled."--U. S. P.

#### Hydrogen Peroxide.

This is a notoriously unstable preparation and even when kept under the most favorable conditions, is liable to deteriorate. Sometimes the pressure in bottle becomes great enough to cause it to explode with great violence.

Many things have been tried to preserve it, some with considerable success; among these are acids, acetanilid, and other amido compounds, benzoic acid, urea, etc.

There is no doubt, as has been shown by many analyses, that acctanilid does help to preserve hydrogen peroxide solutions, though after a certain lapse of time, the odor of nitrobenzole becomes distinctly noticeable.

"Should be kept in a cool place."-U. S. P.

We would suggest that it, as well as Hydrozone, Pyrozone (5%) Glycozone, Conc. Ethyl Nit., and other preparations of this nature, be kept in a dark closet, sc that in case of an explosion taking place, there will be no danger from flying pieces of glass.

#### Fowler's Solution.

The arsenic in this solution should be in the arsenous condition, but if unduly exposed to the air, it absorbs oxygen and is converted into the arsenate.

It would be well to keep this preparation in small, well filled, well stoppered bottles.

#### Donovan's Solution.

This is another arsenic preparation, containing the iodide of both mercury and arsenic.

This preparation sometimes turns yellow or even deep

red, due to the liberation of free iodine. This can be prevented by the addition of a small globule of mercury, to the bottle, and shaking until the color of the iodine disappears.

#### Solution Ammonium Acetate.

This preparation is intended to be a carbonated solution, and if left exposed for some time, it loses carbon dioxide and becomes stale, and flat to taste.

"Should be freshly made when wanted."--U. S. P.

#### Lime Water.

Owing to the fact that this preparation absorbs carbon dioxide from the sir, precipitating the calcium as carbonate, it soon loses its strength.

Lime water should not be kept in too warm a place, as calcium hydroxide is more soluble in cold than in warm water; for example—a saturated solution of calcium hydroxide at 25°C, contains about .14%, while at 15°C it will contain about .17%.

In the keeping of lime water, we would suggest that druggists make up quantities of ten gallon lots, or more.

Then take a bottle or carboy that will hold, say five gallons, and place it on a shelf of suitable height, and arrange it as shown in the accompanying diagram.

It would be well to have two (2) bottles of this size, one to be used to prepare the solution in, while the other one contains the finished product. Allow the undissolved calcium hydrate to settle, before changing bottles, and connecting up with syphon.

The turned up end of tube (see diagram), prevents disturbing the sediment when siphoning off the lime water.

The tubing can be bent to any angle, by heating to redness in gas or alcohol flame, and the carbon dioxide trap can be made out of an ordinary wide mouth bottle, partly filled with a strong solution of sodium hydroxide, or, soda lime may be used.

After filling outlet tube by suction, the liquid in bottle may be siphoned out as wanted, by opening stop cock at the lower end of outlet tube. The rubber joint prevents breakage of tube, by rendering it less rigid.



Lime water may be kept for months in this way, without change, if kept in a cool place.

#### Chlorine Water.

"Should be freshly made when wanted."-U. S. P.

However, by keeping in partially filled, glass stoppered, amber colored bottles, in a dark cool place, it may be preserved for some time unaltered. The glass stoppers should be coated with parafin.

#### Solution Chlorinated Soda.

"Should be kept in well stoppered bottles, protected from light, and in a cool place."-U. S. P.

#### Solution Formaldehyde.

The greatest trouble in keeping formaldehyde solution, is its tendency to be converted into a polymer, known as paraformaldehyde, causing the solution to become turbid.

When not intended for medicinal use, methyl alcohol is sometimes added to the extent of 20% in formaldehyde solutions to prevent polymerization, when intended for use as a disinfectant, or to kill smut in grain, such as wheat

"Should be kept in well stoppered bottles, in a cool place, protected from light."-U. S. P.

#### Solution Mercuric Nitrate.

"Keep in glass stoppered bottles."-U. S. P.

Compound Solution of Iodine. (Lugol's Solution). "Keep in glass stoppered bottles."-U. S. P.

#### Solution of Magnesium Citrate.

The solution as prepared by the present Pharmaconosia. contains the tribasic magnesium citrate, and is much more stable than the former preparation.

Only enough should be prepared to last a short time, as it is liable to precipitate a white sediment and become unfit for use.

"Should be freshly prepared when wanted."-U. S. P.

#### Solution Lead Sub Acetate. (Goulard's Extract.)

Should be carefully protected from exposure to air, as it readily absorbs CO<sup>3</sup> and becomes turbid, due to the formation of lead carbonate.

"Keep in well stoppered bottles."-U. S. P.

#### Diluted Lead Sub Acetate Solution.

The distilled water that is used in making this preparation, should be boiled and then cooled before adding to lead solution. This is necessary to drive off absorbed  $CO^{\circ}$ , and prevent precipitation of lead carbonate.

"Keep in well stoppered bottles."-U. S. P.

#### Solution Potassium Citrate.

It is advisable to keep the solution of the ingredients separate, and mix them as required, if the trade warrants keeping stock solutions.

"Should be freshly made when wanted."---U. S. P.

#### Solution of Potassium Hydroxide.

Solution of Sodium Hydroxide.

"Should be kept in bottles made of green glass, and provided with glass stoppers, coated with paraffin or petrolatum."--U. S. P.

#### Compound Solution of Sodium Phosphate.

"Keep the solution in well stoppered bottles, in a moderately warm place."-U. S. P.

#### Chalk Mixture.

This preparation is very apt to spoil by fermentation during warm weather, and the introduction of compound chalk powder into the U. S. P. makes the extemporaneous preparation of chalk mixtures very easy. There is no excuse for not dispensing a *fresh preparation*.

"Should be freshly made when wanted."-U. S. P.

#### Compound Iron Mixture (Griffith's Mixture).

The iron in this preparation should be in the ferrous condition, but on exposure to air, it is oxidized to the ferric state, the preparation becoming brownish instead of the greenish color as seen in a well made, freshly prepared preparation.

"Should be freshly made when wanted."-U. S. P.

#### Mucilage of Acacia.

"Should be kept in well stoppered, completely filled bottles, in a cool place."--U. S. P.

#### The Preservation of Drugs.

Mucilage Elm.

Mucilage of Sassafras Pith.

"Should be freshly made when wanted."-U. S. P.

#### Oleate of Mercury.

This preparation has a tendency to reduce to metallic mercury, which is partially due to the impurities in the oleic acid used.

"Preserve in tightly stoppered bottles,"-U. S. P.

Oleo-resin of Aspidium.

Oleo-resin of Capsicum.

Oleo-resin of Cubebs.

Oleo-resin of Lupulin.

Oleo-resin of Pepper.

Oleo-resin of Ginger.

"Keep in well stoppered bottles."-U. S. P.

#### Seidlitz Powders.

Should not be stored in a damp place, as the tartaric acid is very liable to deliquesee sufficiently to be absorbed by the paper, nor should they be stored in too warm a place, as the sodium bicarbonate loses CO<sup>2</sup> and is converted into the normal carbonate.

A very good plan is to store the white and blue powders separately in empty 25-ounce quinine sulphate cans.

"Keep the powders in well closed containers, in a dry place."-U. S. P.

#### Compound Licorice Powder.

This preparation is sometimes attacked by insects, in which case there is only one thing to do-throw it away.

This may be *prevented* by adding a few drops of chloroform to the container, thus saturating the air in the bottle with chloroform vapors.

"Keep in well closed vessels."-U. S. P.

#### Compound Morphine Powder.

Owing to the volatile nature of the camphor, this powder should be kept in tightly stoppered bottles, and in a cool place.

"Transfer it to well stoppered bottles."-U. S. P.

#### Spirits.

On account of the volatile nature of this class of preparations, it is well to store them in a cool place, and out of direct sunlight.

The following preparations have special directions for keeping:----

#### Spirit of Nitrous Ether.

It is advisable to put up spirit of nitrous ether in one, two, three or four ounce bottles, and seal by dipping neck of bottle in melted paraffin. Then keep in a dark cool place.

Keep in "small, well stoppered, dark amber colored vials, in a cool place, remote from light or fire."-U. S. P.

#### Spirit Ammonia.

Spirit Ammonia, Aromatic.

"Should be kept in glass stoppered bottles, in a cool place."-U. S. P.

#### Compound Spirit of Orange.

"Keep in completely filled, well stoppered bottles, in a cool and dark place."-U. S. P.

#### Suppositories.

There is only one official suppository, but the druggist is often called upon for extemporaneous, or manufactured suppositories, and he should not only endeavor to send them out in good condition, but so that they will remain so until used. This rule should hold good with all other preparations that he dispenses.

Cocoa Butter suppositories are very apt to melt or get soft if handled too much, or kept in too warm a place.

Glycerinated Gelatin suppositories should be kept and dispensed in wide mouthed bottles, or other tightly closed containers, and kept in a cool place, in order to protect them from the effect of heat, dry sir, or moisture.

#### Glycerin Suppositories.

"Should be preserved in tightly stoppered, glass ressels."-U. S. P.

.60

#### Syrups.

This is one of the most troublesome classes of prepurations that the druggist is afflicted with, on account of many of the official syrups seldom being called for. and the druggist usually finds that the stock on hus has spoiled, by becoming sour, or mould has formed in the bottle, etc., this usually occurring just when a "hurry up" prescription is received.

Consequently the making of syrups should receive the druggist's most careful attention, for while careful attention to details will not always prevent the spoiling of his syrups, yet it will prevent it to a great extent.

Syrups deteriorate for several reasons.

First-Impure sugar used.

Second-Invertion of sugar to fermentable sugar, by (a) acids, being present in solvent; (b), heating too long.

Third-Excess sugar used which subsequently crystallizes out, leaving weak syrup.

Fourth-Insufficient amount of sugar used.

Fifth-Contamination with moulds, yeast "germs," and other fermentative bacteria.

Sixth—Loss of active ingredients by (a) volatilization by heat, e. g. syrup of wild cherry, etc., (b), oxidation, e. g. Fe I<sup>2</sup>.

Seventh-Discoloration caused by caramelization of sugar by acids.

These changes may be prevented to a large extent by-

First-Use pure sugar and carefully adjust the proportion of sugar to solvent.

Second—Filling small bottles completely full with the hot syrup and stoppering *tightly*, and keeping in cool place.

Third-By use of preservative, as specified in Pharmacopoeia, as in syrup Hydriodic acid, etc.

Fourth-By use of "Cold process," which prevents the formation of fermentable sugars.

Fifth-By preparing only enough syrup that can be used up quickly.

#### Tinctures.

The Pharmacopoeia gives no general directions for the

preservation of tinctures, but with a few exceptions, they are as a class quite stable. They contain less extractive matter than the fluid extracts, and hence are less liable to precipitate and become unsightly.

Tinctures of Aconite, Belladonna, Hyoscyamus, Stramonium, etc., are claimed to lose part of their alkaloidal strength after being kept for some time, but this has been shown fairly conclusively, not to be the case. However, it is best not to keep in stock more of this kind of tincture than can be used up within a reasonable length of time.

As a rule, this class of preparations is quite stable, under ordinary care.

#### Tr. Aloes.

The aloin frequently crystallizes out on the side of the container, and in this way reduces the strength.

#### Tincture Cinchona.

Deposits cinchona red, holding a portion of the alkaloids, the strength being slightly reduced.

#### Tincture of Digitalis.

Should be protected from strong light.

#### Tincture of Nux Vomica.

Owing to the slight solubility of sugar of milk in strong alcohol, this preparation sometimes becomes turbid, caused by the sugar of milk used as a diluent in the extract of Nux Vomica. The tincture should be dispensed perfectly clear.

Care should also be used to prevent loss of alcohol from this strongly alcoholic preparation, as any great loss of alcohol might dangerously increase the strength of the tincture.

#### Tincture of Opium (Laudanum).

Should be kept in well stoppered bottles; when long kept and frequently exposed, Laudanum becomes thick, and acts with unexpected energy.

#### Tincture Krameria.

This preparation sometimes deposits krameria red, and gelatinizes; is best kept in small well stoppered bottles.

#### Tincture Ferric Chloride.

According to the Pharmacopoeia, this preparation should be made and allowed to stand for at least three months, protected from light.

The object of this is to allow the formation of a small amount of esters, which give it a more agreeable odor, and doubtless modify the astringency.

The tincture is affected by light, with the formation of ferrous iron.

"Let the tincture stand, in a closely covered vessel, protected from light, at least three months; then transfer it to glass stoppered bottles, and keep it protected from light."—U. S. P.

#### Tincture of Iodine.

There is hardly a preparation in the Pharmacopoeia which varies so much as this one, which is due to two causes—

First-Carelessness in preparing.

Second-Carelessness in storing and keeping.

The first cause needs no comment, it speaks for itself; the second cause has certain extenuating circumstances which may relieve the druggist of a certain portion of the responsibility.

Tincture of Iodine, when prepared without Potassium Iodide, rapidly forms ethyl iodide, and hydriodic acid, with corresponding loss of free iodine, which is entirely prevented by the use of the quantity of potassium iodide directed by the U. S. P.

If exposed, it loses alcohol faster than it does iodine, becoming rapidly stronger, sometimes reaching a concentration of 200%, or more, of the U. S. P. strength.

Should be kept in tightly stoppered bottles, in a cool place, and never be dispensed with cork stoppers, as iodine rapidly attacks cork.

#### Tincture of Kino.

The great trouble with tincture of kino, is its tendency to gelatinize. This can be prevented if the directions of the U. S. P. as to heating, be carefully carried out, and then keeping in small, well stoppered bottles.

#### Ointments.

Any ointments, unless protected by some preservative, like benzoin, poplar buds, etc., are very apt to spoil and become rancid in a short time unless carefully prepared and kept.

Stock ointments should be kept in non-permeable containers, such as glass or glazed porcelain jars, free from cracks and other flaws.

In making up a new batch of any ointment, great care should be taken that the containers are perfectly clean, not apparently so, for the slightest trace of rancid fat remaining will greatly accelerate the change.

If too high a heat be used in making an ointment, it is very liable to dissipate some of the volatile ingredients, and also cause the fatty base to become rancid.

Ointments should be dispensed in glass or porcelain jars, or in collapsable tubes, which effectively protect them from air. Some ointments are readily affected by contact with metallic substances, and care should be used in preparing and dispensing same.

#### **Ointment of Tannic Acid.**

"Avoid the use of iron utensils."-U. S. P.

#### Diachylon Ointment.

This ointment very quickly becomes rancid and hence "should be prepared extemporaneously,"-U. S. P.

#### Nut Gall Ointment.

"Avoid the use of metallic utensils."-U. S. P.

#### Ointment of Yellow Mercuric Oxide.

Ointment of Red Mercuric Oxide.

Citrine Ointment.

#### Iodine Ointment.

"Avoid the use of metallic spatula; should be freshly made when required."-U. S. P.

Ł

Ointment of Potassium Iodide.

"Should be prepared extemporaneously."--U. S. P.

#### Fixed Oils.

Very little trouble should be experienced with this class of oils, as they are quite stable, the main points to be observed are their protection from air and moisture.

Some of the fixed oils such as the drying (e. g. linseed oil) and semi-drying oils (e.g. castor oil), have unsaturated bonds or linkings in the molecule, and will absorb oxygen from the air, becoming oxidized and much thicker, and if in thin layers forming a film or varnish. The nondrying oils, such as olive or cotton seed oil, lard oil, etc., become rancid, due to the liberation of the fatty acid.

The druggist should make it a point to dispense only bland, non-rancid oils, fats, etc., and should keep his stock of oils, etc., in a cool place, in well closed containers, free from water.

#### Castor Oil.

"Should be kept in well stoppered containers."-U. S. P.

#### Cotton Seed Oil.

"Should be kept in well closed containers."-U. S. P.

#### Croton Oil.

#### Cod Liver Oil.

"Should be kept in cool place, well stoppered bottles, which have been thoroughly dried before filling."--U. S. P.

#### Olive Oil.

"Should be kept in well stoppered bottles, in a cool place."-U. S. P.

#### Expressed Oil Almonds.

#### Linseed Oil.

"Should be kept in well stoppered containers."-U. S. P.

#### Volatile Oils.

As a general rule, the largest constituent of volatile

oils consists of hydrocarbons, which are quite easily affected by oxidation; the really valuable parts of volatile oils are present in small amounts, and have a delicate odor, characteristic of that particular oil. This portion of the oil is very easily affected by changes that may take place in itself or in some other constituent of the oil, producing a marked deterioration in the delicate odor or flavor of the oil.

It is best to keep the oil in the bottle that it comes in, rather than to transfer it to more showy glass labeled, glass stoppered shelf bottles. Very few, if any, of the so-called ground glass stoppered shelf bottles found in drug stores, are fit for anything but the ash barrel. We believe that there are more good drugs sacrificed on the altar of showy shelf bottles than one realizes, for the average shelf bottles leave the drug or preparation at the mercy of the chemical rays of light, the ground (?) glass stoppers allow air to get in and exert its oxidizing effect, and they allow volatile substances to evaporate almost without let or hindrance.

The amber colored cork stoppered bottles are much superior in this respect, if not quite so pretty and elegant looking.

There is one point that should be closely looked after and that is to keep the mouth of the bottle clean, otherwise the resincus matter that forms by oxidation of the small amount of oil adhering there each time the bottle is used, will contaminate the contents, giving it an unpleasant odor.

#### Oil of Bitter Almonds.

"Keep in small, well stoppered, completely filled, amber colored bottles, protected from light and air."-U. S. P.

#### Benzaldehyde.

"Should be kept in small, amber colored, well stoppered bottles."-U: S. P.

#### Oil of Anise.

"Should be kept in well stoppered, amber colored bottles,

#### Oil of Orange Peel.

"Should be kept in small, well stoppered, amber colored bottles, in a cool place, so as to avoid as far as possible, the development of a terebinthinate odor. Oils that have developed such an odor should not be dispensed."-U. S. P.

#### Oil Cajeput.

"Should be kept in well stoppered amber colored bottles, in a cool place."-U. S. P.

- Oil of Betula.
- Oil of Caraway.
- Oil of Cloves.
- Oil of Chenopodium. Oil of Cinnamon.
- Oil of Copaiba.
  - Oil of Coriander.

  - Oil of Cubeb. Oil of Erigeron.
  - Oil of Eucalyptus.

  - Oil of Fennel. Oil of Gaultheria.
  - Oil of Hedeoma.

  - Oil of Juniper. Oil of Lavender Flowers. Oil of Lemon.

×.

- Oil of Peppermint.
- Oil of Spearmint. Oil of Myristica.
- Oil of Rose.
- Oil of Rosemary.
- Oil of Savin. Oil of Santal.
- Oil of Sassafras.
- Oil of Thume.
- Volatile Oil of Mustard.

"Should be kept in well stoppered, amber colored bottles, in a cool place, protected from light."-U. S. P.

Oil Turpentine.

"Should be kept in well stoppered bottles."-U. S. P.

Rectified Oil Turpentine.

"Keep in well stoppered, amber colored bottles, in a cool place."-U. S. P.

#### Fluid Extracts.

Should be kept in dark colored bottles, securely corked, and in a place not exposed to marked changes in temperature.

Many fluid extracts, unless properly kept, will lose alcohol by evaporation, causing a marked precipitation, which may carry down with it a considerable portion of the active ingredients, though in a great many instances the precipitates have been found to be physiologically inactive.

Direct or strongly diffused sunlight also has the property of causing precipitation in fluid extracts, hence they should be kept in a cool, dark place, and in dark bottles.

#### Extracts.

The main thing about keeping extracts is to keep them in the condition they are expected to be used in; solid extracts should not be allowed to dry out, and powdered extracts should be kept perfectly dry.

#### Extract of Colocynth.

Comp. Extract of Colocynth.

"Should be kept in well stoppered bottles."-U. S. P.

#### Extract of Nux Vomica.

Extract of Opium.

"Should be kept in well stoppered, amber colored vials." ---U. S. P.

#### MISCELLANEOUS DRUGS.

#### STERILIZATION.

There is a number of drugs, preparations, etc., with which the modern druggist has to contend, which must be kept or dispensed in a sterile condition, hence a few words here concerning sterilization and disinfection will not be out of place.

A substance is said to be *aseptic* when entirely free from living germs.

This condition may be brought about in one of two ways (1) by sterilization; (2) by disinfection.

Sterilization means the destruction of germ life on or within a body, by means of heat. This may be done either by dry or moist heat, and can only be applied to such substances as will not be injuriously affected by the temperature required to destroy germ life.

Disinfection means rendering a substance free from living germs by use of chemicals, agents, etc.

Partial disinfection consists in the use of such substances as will inhibit or prevent the growth of germs, without entirely destroying them; such substances are called *antiseptice*.

Sterilization by heat is preferable wherever it can be applied as it is complete and does not introduce any foreign substances. Dry heat is more effective than moist heat, but of course can only be applied to dry bodies, such as bottles, ointment jars, flasks, funnels, spatulas, stirring rods, and some times surgical instruments, etc.

The temperature necessary is 150° to 200° Centigrade, (300° to 392°F) or about the temperature at which cotton begins to turn brown. An ordinary stove oven will answer the purpose admirably. Time necessary is about 1 to 14% hours.

Moist heat is used on all liquid substances, and some solids. For the average drug store operations, this may be performed by suspending the bottle of solution, stoppered with cotton, in boiling water. It should be subjected to the boiling temperature of the water not less than twenty minutes.

This means of sterilization is applicable to all solutions that are not decomposed at the boiling temperature of water.

Pasteurizing is heating to 60°C which should be repeated

twice, on successive days, in order to kill the spores which may develop in the mean time.

Among the substances that the pharmacist may be required to sterilize, are the different preparations that are apt to decompose through bacterial action, such as syrups, infusions, decoctions, ointments, injections, etc.

Dusting powders are sometimes required to be dispensed in a sterile condition, which if not volatile at the temperature of 150-170°C. may be sterilized by dry heat.

Zinc oxide, tale, boric acid, calomel, etc., may be rendered sterile in this manner.

Hypodermic injections are very difficult to sterilize on account of the easy manner in which the potent substances are decomposed. For this reason it is sometimes necessary to use some chemical agent to destroy the germs; carbolic acid, salicylic acid, corrosive sublimate, thymol, hydrogen peroxide, formaldehyde, etc., have been used, but a 3% solution of carbolic acid has proven less objectionable than any other germicide for this purpose.

#### Antiseptic Gauzes, bandages, etc.

The pharmacist is seldom called on to prepare this class of preparations, but he should use care and have a knowledge of bacterial contamination in order to keep them properly.

They should be kept away from dust, and be handled as little as possible, otherwise they are liable to become contaminated.

#### Medicated and Toilet Soaps.

Milled or toilet soaps are usually perfumed or scented in order to cover up any disagreeable odor from the soap stock, and to give a pleasant odor to the soap. They usually contain from 10 to 30% water, and should not be exposed to an excessively hot atmosphere, as that causes the soap to dry out and become hard, and if much alkali be present, it seems to accumulate near the surface, especially if the soap contains glycerin.

They also discolor more rapidly if exposed to too much heat.

#### Castile Soap.

The U. S. P. states that this soap "contains about 30%

water," and is usually bought by the druggist by weight, so unless kept properly will lose considerable of its weight. Should be kept in a closely covered container, or wrapped in waxed paper.

#### Bichloride Soap.

This medicated soap is very prone to decomposition and is usually colored to conceal such change.

If the soap base contains any free alkali, it will react with the mercury salt, causing the soap to take on a greenish tinge. A good sublimate soap should be perfectly white or cream colored, and not develop a greenish tinge.

#### Phenol Soap.

This is liable to lose phenol if kept too long and unduly exposed.

#### Granular Effervescent Powders.

This class of preparations is very unstable, as it is a mechanical mixture of an acid body with a carbonate and the medicinal agent, and needs only the presence of moisture to set up the chemical reaction between the acid and alkali.

Therefore it is very necessary that this class of preparations be kept in a perfectly dry condition, and in a cool place.

In conclusion we would like to add that while we are aware that this bulletin does not over the entire field of drugs handled by the pharmacist, there being many lines not touched upon in the preceding pages, still we hope that what we have given will be of some assistance to the druggist who is honestly trying to dispense drugs of prime quality and strength.

It might be well to call attention of those who have a copy of the Pharmacopoeia, to study it well, for there is a world of information contained within its pages, and those druggists who haven't a copy of it will do well to secure one and use it.

The United States Pharmacopoeia is the legal standard for drugs within the state of Kentucky, and no druggist will be exempt from its requirements.

The author hereby wishes to express his thanks and appreciation for the many helpful suggestions and criticisms during the preparation of this bulletin, to Mr. James H. Martin, former drug inspector for this Station.

# INDEX

Acetone	
Acetic Ether	
Acid Benzoic	
Acid Hydriodic Diluted	
Acid Hydrobromic Diluted	
Acid Hydrophlaric	
Acid Hydrophlevic Tiluthd	Contractor service
Acid, Hydroemenid, Diluted	
Acid, Hydrocyanic, Difuted	
Acia Nitric	con the case occurs to
Acia, Nitric, Dilutea	
Acid, Nrironydrochioric	*****
Acid, Nitrohydrochloric, Diluted	
Acid, Phosphorie	
Acid, Sulphuric	
Acid, Sulphuric Aromatic	adaa aaxaa aaxaa
Acid, Trichlor acetic	
Aconitine	
Alcohol	
Alcohol. Absolute	
Alcohol. Diluted	
Ammonia Water	
Ammonia Water Stronger	
Ammonium Benzoste	
Ammonium Bromide	
Ammonium Carbonate	
Ammonium Iodido	
Ammonium Soliceisto	• • • • • • • • • • • • • • • • • • • •
Ammonium Valorato	
Amul Mitnito	<b></b>
Amy Number Course bendenen sta	
Antiseptic Gauzes, bandages, etc	*************
Apomorphine Hydrochloride	• • • • • • • • • • • • • • • • • • • •
Arsenous loaide	
Atropine	· · · · · · · · · · · · · · · · · · ·
Belladonna Root	
Benzaldehyde	
Benzín, Petroleum	
Bismuth and Ammonium Citrate	
Bromine	
Bromoform	
Calcium Bromide	
Calcium Chloride	
Calcium Hypophosphite	
Calcium Sulphate, Exsiccated	
Calomel	
Camphor	2
Canglenna	
Onbarrane	

Carbon Bis	piphiđe	107 B		Pa
Chalk Miv	Dre		************	
Chloralfor	amida	•••••	***********	terrer and the set
Chlorel Ma	drata	• • • • • • • • • • •		
Chloroform	41 BUC			
Chlorotori		•••••••	**********	
Chiorine w	ater			are not exercise of a
Chromnum	Irioxide	• • • • • • • • • • •	*******	
Cinnamic J	laenyae			• • • • • • • • • • • • • • • •
Cloves	*****			
Codeine	• • • • • • • • • • • • • • • • • • • •			
Codeine P	osphate			
Codeine St	lphate			<b></b> .
Colchicine	******			
Collodion .				
Collodion f	typtie			
Collodion 1	lexible			
Collodion (	antharidal			
Columbo .				
Compound	Solution Iodine			
Compound	Morphine Powder .			
Compound	Licorice Powder .			
Compound	ron Mixture			
Conjum				
Cresol				
Chrygarchi				
Digitalia				
Donounn's	Polution		•••••	
Distilled W	solution			
Dischied w	Matmont			
Diacaylon	nnuneat	******		
Enervescer	rowders Granula			
Ergot	********	• • • • • • • • • • • •		**********
Etner			• • • • • • • • • • • • • • • •	
Ethyl Chlor	1de	· · · · · · · · · · ·	*********	
Etherial Oi				
Extracts			· • • • • • • • • • • • • • • • • • • •	
Extract of	Colocynth			
Extract Co	ocynth Comp			
Extract Nu	Vomica			
Extract Op	um			
Ferric Chic	ride			
Ferric Citr	te			
Ferrous Su	phate			
Fluid Extra	cts			
Formaldehy	de. Solution of			
Fowler's S.	lution			
Ferric Phot	nhate Soluble			
Porrie Powe	Phosphate Soluble			
filveerin G	nositories			
Cold and C	dium Chlorida			
Guid and S	Juran Chorne		**********	
Gualacoi .			••••••••••	
Hexamethy	enamine		• • • • • • • • • • • • • • • • • •	
nomacropin	e riyaropromide		*******	
	and the second sec			eren era era are anaren d
Hydrastine			************	

Hyosc	ne Hydrobromide
Hyoso	yamine Hydrobromide
Hyosc	zamine Sulphate
Iodine	
Iodol	
Iodofo	m
Iron a	ad Ammonium Citrate13
Iron a	nd Ammonium Sulphate
iron a	nd Ammonium Tartrate
Iron a	1d Potassium Tartrate
iron a	1d Quinine Citrate
iron a	ad Quinine Citrate Soluble
fron a	id Strychnine Citrate
iron,	seauceo
Leau	ACCALC
Load	Oulde
Lood	1/1 ale
Lond	Jaide
Limo	14,8101
Lime	Ablarinated 19
Lime,	Chloringted 12
Lime,	Weter 15
Lithin	n Benzosta
Lithin	n Bromide
Lithin	n Carbonsto 34
Lithin	n Citrato 14
Lithin	m Clitrate Effervescent
Lithin	n Salicylate
Magne	sium Sulphate
Magne	sium Sulphate Effervescent
Magne	sium Oxide
Manga	nese Hypophosphite
Manga	nese Sulphate
Mercu	ric Obloride
Mercu	rous Chloride14
Mercu	rous Iodide (Yellow)14
Mercu	ric Iodide (Red)
Mercu	ric Oxide (Red)14
Mercu	ric Oxide (Yellow)14
Mercu	ry, Ammoniated
Mercu	ry with Chalk
Mercu	ry, Oleate of
Menth	0]
Methy	l Salicylate,
Morph	ine Acetate
Morph	ine Hydrochloride1
Morph	ine Sulphate
Mucil	ge of ACBCIa
Mucil	ge of Sassairas Fith
Mucil	ge bilm
Napht	Lalene
CHI A	monds Expressed

Oil of Anise     Oil of Betula     Oil, Cajeput     Oil of Caraway     Oil of Cloves     Oil of Conseed     Oil of Conader     Oil of Cubeb     Oil of Cubeb     Oil of Eucalyptus     Oil of Fenel     Oil of Fenel     Oil of Tedeoma     Oil of Julper     Oil of Lavender Flowers     Oil of Lavender Flowers	
Oll of Betula     Oll, Cajeput     Oll of Caraway     Oll of Cloves     Oll of Consend     Oll of Copaiba     Oll of Corlander     Oll of Corlander     Oll of Crotonseed     Oll of Erigeron     Oll of Erigeron     Oll of Fennel     Oll of Glacuptus     Oll of Hedcoma     Oll of Lavender Flowers     Oll of Lavender	
Oll, Cajeput     Oll of Caraway     Oll of Caraway     Oll of Chenopodium     Oll of Corano     Oll of Corander     Oll of Cottaneed     Oll of Cubeb     Oll of Cubeb     Oll of Encelyptus     Oll of Fennel     Oll of Fennel     Oll of Fennel     Oll of Feenel     Oll of Julper     Oll of Lavender Flowers     Oll of Lavender Flowers     Oll of Lavender Flowers	1
OI of Caraway     Oil of Caraway     Oil of Cloves     Oil of Consend     Oil of Corlander     Oil of Cubeb     Oil of Erigeron     Oil of Erigeron     Oil of Fennel     Oil of Gaultheria     Oil of Hedcoma     Oil of Lavender Flowers     Oil of Lavender	1
Oil, Castor     Oil of Chores     Oil of Chores     Oil of Chores     Oil of Cores     Oil of Cores     Oil of Copaiba     Oil of Copaiba     Oil of Coriander     Oil, Cottonseed     Oil, Crotona     Oil of Cubeb     Oil of Eucalyptus     Oil of Fennel     Oil of Hedcoma     Oil of Jacobard     Oil of Lavender Flowers     Oil of Lavender Flowers     Oil of Lavender Slowers	
Dil of Cloves Dil of Cloves Dil of Clonepodium Dil of Contanton Dil, Col Liver Dil, Col Liver Dil, Cottonseed Dil, Cottonseed Dil, Cottonseed Dil of Cubeb Dil of Erigeron Dil of Brigeron Dil of Fennel Dil of Fennel Dil of Gaulteria Dil of Hedeoma Dil of Javender Flowers Dil of Lavender Flowers Dil of Lavender Flowers Dil of Lavender Flowers	
Di of Chenopodium     Di of Cinnamon     Dil, Cod Liver     Di of Copaiba     Di of Copaiba     Di of Copaiba     Di of Copaiba     Di of Coriander     Di, Cottonseed     Di, Cotton     Di of Cubeb     Di of Facalyptus     Di of Facalyptus     Di of Gaultheria     Oil of Hedcoma     Oil of Juniper     Di l of Lavender Flowers     Oil of Lavender Stowers	
Oil of Cinimation     Oil, Cod Liver     Oil of Cogalba.     Oil of Corlander     Oil of Corlander     Oil, Cottonseed     Oil of Cubeb     Oil of Erigeron     Oil of Fennel     Oil of Gedulperion     Oil of Gaultheria     Oil of Hedeoma     Oil of Lavender Flowers     Oil of Lavender	
Ol of Containen     Oll of Copaiba     Oll of Copaiba     Oll of Coriander     Oll, Cottonseed     Oll of Cubeb     Oll of Cubeb     Oll of Encalyptus     Oll of Fennel     Oll of Hedeoma     Oll of Javender Flowers     Oll of Lavender	
Di, Cou Liver Di of Copaina Di of Coriander Di of Coriander Di, Cottonseed Di of Cuebe Di of Erigeron Di of Erigeron Di of Fanel Di of Fennel Di of Fennel Di of Gaulteria Oli of Hedeoma Oli of Hedeoma Oli of Javender Flowers Oli of Lavender Flowers	
Oll of Coriander     Oll of Coriander     Oll, of Cottonseed     Oll of Cubes     Oll of Cubes     Oll of Engeron     Oll of Figeron     Oll of Hedeoma     Oll of Lavender Flowers     Oll of Lavender	
Oll of Coriander Oll, Cottonseed Oll, Croton Oll of Cubeb Oll of Erigeron Oll of Eucalyptus Oll of Fucalyptus Oll of Fucalyptus Oll of Fucalyptus Oll of Gaultheria Oll of Hedeoma Oll of Hedeoma Oll of Juniper Oll of Lavender Flowers Oll of Lavender Flowers	· · · · · · · · · · · · · · · · · · ·
Oil, Cottonseed Dil, Cotton Dil of Cubeb Oil of Cubeb Oil of Encelyptus Oil of Fanel Oil of Gaultheria Oil of Jenel Oil of Jenel Oil of Jenel Dil of Jenel Dil of Jenen Oil of Lavender Flowers Oil of Lavender Flowers	······
Oil, Croton Oll of Cubeb Oll of Erigeron Oil of Eucalyptus Oil of Funcel Oil of Gaultheria Oil of Hedeoma Oil of Hedeoma Oil of Juniper Oil of Lavender Flowers Oil of Lavender Flowers	· · · · · · · · · · · · · · · · · · ·
Oll of Cubeb Oll of Erigeron Oll of Facalyptus Oll of Famel Oll of Gaultheria Oll of Jultheria Oll of Jultheria Oll of Julther Oll of Lavender Flowers Oll of Lavender Flowers	
Oll of Erigeron Oll of Eucalyptus Oll of Eucalyptus Oll of Gaultheria Oll of Hedeoma Oll of Juniper Oll of Lavender Flowers Oll of Lavender Flowers	
Oll of Eucalyptus Dil of Fennel Dil of Gaultheria Dil of Hedeoma Oll of Juhjer Dil of Lavender Flowers Dil of Lavender Flowers	
Dil of Fennel Dil of Gaultheria Oll of Hedeoma Oll of Juniper Dil of Lavender Flowers Dil of Lavender Slowers	
Oll of Gaultheria Oll of Hedeoma Oll of Juniper Oll of Lavender Flowers Oll of Lavender Flowers	
Oll of Hedeoma Oll of Juniper Oll of Lavender Flowers Oll of Lavender Slowers	
Oil of Juniper Oil of Lavender Flowers Oil of Lemon	
Oil of Lavender Flowers Oil of Lavender Flowers Oil of Lemon	
Oil of Lavender Flowers	· · · · · · ·
Oil of Lemon	*****
	*****
Oil of Myristica	
Oil of Peppermint	
Oil of Spearmint	
Oil of Sassafras	
Oil of Bose	
Oil of Bosemary	
Oll of Savin	
Oil of Santal	
On the state of the second sec	
OH, LINSeed	*****
Oils, Fixed	
O11, O11ve	
Oil, Turpentine	. 150,
Oil, Turpentine, Rectified	150,
Oil of Orange Peel	
Oil of Mustard, Volatile	
Oils. Volatile	
Gintmente	strates said
Ointment Citrine	
Ontment Dischalen	
Olatiment Talles	
Ointment, Iodine	
Ointment, Nutgail	
Ointment, Potassium Icdide	
Ointment, Tannic Acid	
Ointment, Mercuric Oxide, (Yellow)	
Ointment, Mercuric Oxide, (Red)	
Oleo-resin. Asnidium	
Oleo-resin Cansicum	
Olearasin Cabele	
Oles seein Cinger	
Oleanala I applia	
Greo-resu, Luputin	

P	age.
Oleo-resin, Pepper	.159
Paraldehyde	150
Pancreatin	141
Pepsin	141
Pelletierine Tannate	152
Phenol Salicylate	.142
Phenol	149
Phosphörous	.149
Physostigmine Salicylate	.152
Physostigmine Sulphate	152
Pilocarpine Hydrochloride and Nitrate	152
Potassium Acetate	142
Potassium Bicarbonate	142
Potassium Bltartrate	142
Potassium Bromide	142
Potassium Carbonate	142
Potassium Chlorate	142
Potassium Citrate	142
Potassium Citrate Effervescent	142
Potassium Cyanide	142
Potassium Dichromate	142
Potassium and Sodium Tartrate	142
Potassium Ferro-cyanide	142
Potassium Hypophosphite	142
Potassium Iodide	142
Potassium Nitrate	142
Potassium Hydroxide	142
Potassium Permanganate	143
Pyrogallol	143
Pyroxylin	143
Powders, Granular Effervescent	171
Quinine	161
Quinine Bisulphate	151
Quinine Hydrobromide	151
Quinine Hydrochloride	151
Quinine Salicylate	151
Quinine Sulphate	152
Reduced Iron	139
Resorcinol	143
Salicin	144
Santonin	143
Seidlitz Powders	109
Suver Cyanide	100
Sliver Nitrate	100
Silver Nitrate moulded	100
Sliver Nitrate mitigated	100
Silver Oxide	100
Soap, Phenol	171
soap, medicated and Tollet	170
SCAP, CASUIC	171
soap, rachioride	144
Socium Acetate	144
Socium Arsenate	144
Sodium Arsenate, Exsiccated	743

Ind	ex.	
•		

				1.040
Soalum	Benzoate			
Sodium	Bicarbonate			
Sodium	Bisulphite	********		
Sodium	Borate			
Sodium	Bromide			
Sodium	Carbonate			
Sodium	Chlorate			
Sodium	Citrate			
Sodium	Hydroxide			
Sodium	Hypophosphite			
Sodium	iodide			
Sodium	Nitrate			
Sodium	Nitrite			
Sodium	Phenol Sulphonate			. 14
Sodium	Phosphate			14
Sodium	Phosphate Effervescer	it		
Sodium	Phoenhate-Exsicoated			14
Sodium	Pyronhoanhate			14
Sodium	Thiogulphate			14
Sodium	Selievisto			14
Sodium	Saleyiate		• • • • • • • • • • • • • • •	
Sodium	Sulphite			14
Solution	of Chloringtod Sade			12
Solution	of Cadium Dhambata	Compound	••••••	
Solution	of Sourum Falosphate	Compound	• • • • • • • • • • • • • •	
Solution	of Magnesium Citrat	е	• • • • • • • • • • • • • •	
Solution	of Mercuric Nitrate		•••••	
Solution	of Ammonium Aceta	е	• • • • • • • • • • • • • •	
Solution	of Potassium Hydrox	ide		
Solution	of Sodium Hydroxid	ð	<b>.</b> .	
Solution	of Lead Sub Acetate			
Solution	of Potassium Citrate			
Solution	of Lead Sub Acetate	Dilute		
Spirit o	Ammonia		**********	
Spirit of	Ammonia, Aromatic			
Spirit of	Nitrous Ether		·····	
Spirit o	Ether			
Spirit o	Ether Compound			
Spirit o	Nitro Glycerin			
Spirit o	Orange Compound			
Sulphon	1			
Salphar				
Sulphur	Weshed			
Salphur	Precipitated			
Sulnhus	Indida			
Support	riog		••••••	16
Supposi	ales Chaomin			10
oapposi	nies, chycerin			16
syrups	· · · · · · · · · · · · · · · · · · ·		••••••	
strontiu	a Bromide			
strontiu	1 100109		<b></b>	
Strontiu	1 Salicylate			
Strychni	ie Nitrate	*********	•••••	
Strychni	e Sulpaste	*		
Steriliza	ton			
Stronger	<b>Orange</b> Flower Wate	Γ		
	4 X E 3			

	Page.
Stronger Rose Water	153
Terebene	146
Terpinhydrate	
Thymol Iodide	
Tinciures	161
Tincture Aloes	
Tincture Cinchona	.162
Tincture Digitalis	162
Tincture Ferric Chloride	163
Tincture Indine	163
Tincture Krameria	162
Tincture King	163
Tincture Nuy Vomics	162
Tincture Onium	162
Theorem	140
Trional contractor of the second seco	150
Turpentine	150
veratrine	104
Zinc Acetate	
Zinc Phenoi Sulphonate	
Zinc Sulphate	146
Zinc Iodide	146
Zinc Bromide	146
Zinc Chloride	146
Zinc Valerate	