

to that of potassium bromide. In 1 or 2 per cent. solutions it has been used with remarkable success as a local application in gonorrhœa of all stages. It seems to readily destroy the gonococcus.

**Pyrogallol**, *Pyrogallic Acid*, *Tri-hydroxy-benzene*,  $C_6H_3(OH)_3$ ,—is a triatomic phenol, obtained chiefly by the dry distillation of Gallic Acid. It occurs in light, white, shining laminae, or fine needles, of bitter taste; soluble in water, alcohol and ether. Dose, gr. j-ij.

**Tannigen** *Diacetyl-tannin* (Unofficial),—is an acetic acid ester of tannin, prepared by the action of glacial acetic acid on tannic acid. It occurs as an odorless and tasteless powder, insoluble in cold water and dilute acids, but soluble in cold alcohol and in dilute solutions of soda, sodium phosphate and borax. It is said to pass through the stomach unchanged and to be gradually decomposed in the intestines, thus exerting an astringent effect upon the entire intestinal canal. Its uses have been those of an intestinal astringent. It appears to be absolutely innocuous. Dose, gr. iij-vij, up to ʒij daily.

**Tannalbin**, *Exsiccated Tannin Albuminate* (Unofficial),—occurs as a light-brown, odorless, and tasteless powder, containing 50 per cent. of Tannic Acid combined with egg-albumin, insoluble in water and in acid fluids. Dose, gr. xv-xxx, up to ʒj or ʒjss daily, as an intestinal astringent.

**Tannocol** (Unofficial),—consists of equal parts of Tannic Acid and Gelatin, and occurs as a light-brown powder, without odor or taste. Dose, gr. vij-xv, 3 to 5 times a day, as an intestinal astringent.

**Tannoform**, *Methylene Di-tannin* (Unofficial),—is a condensation product of Tannic Acid and Formaldehyde, and occurs as a bulky, odorless powder, insoluble in water, but soluble in alcohol or ether, also in alkalis. Dose, gr. iv-vij, as an intestinal astringent.

#### Incompatibles.

Incompatible with *Gallic Acid* are: Arsenic, Carbonates, Copper salts, Ferric salts, (unless excess of acid present), Gold salts, Lead Acetate, Iodine, Lime-water, Nitric Acid, Opium in solution, Potassium Permanganate, Silver salts, Sodium Bicarbonate, Tartar Emetic.

Incompatible with *Tannic Acid* are: Albumin, Alkaloids, Amyl Nitrite, Antipyrine, Arsenic, Bromine, Calcium Chloride (concentrated solution), Chlorine, Chromic Trioxide, Ferric salts, Gelatin, Glucosides, Gluten, Hydrochloric Acid, Iodine, Iodoform, Lime-water, Nitric Acid, Permanganates, Piperazin; Salts of Antimony, Bismuth, Chromium, Copper, Gold, Lead, Mercury and Silver; Spirit of Nitrous Ether, Potassium Chlorate and other oxidizers, Potassium Dichromate, Sulphuric Acid.

#### PHYSIOLOGIC ACTION AND THERAPEUTICS.

Gallic Acid, and its congener Tannic Acid, are astringents, the former being the feebler of the two. They differ in that tannic acid coagulates albumin and gelatin, while gallic acid does not. According to some authorities the difference between gallic and tannic acids is one of oxidation, according to others of hydration; the latter assuming tannic acid to be simply gallic acid anhydride. They constrict the muscular tissue in the walls of the minute vessels, thus checking secretion and hemorrhages and cutting short local inflammations. Except in enormous doses, they are harmless. Gallic Acid is preferred to tannic acid when an astringent action is desired upon remote parts, as the lungs, kidneys, etc., which can only be reached through the circulation. In hematuria, distant passive hemorrhages, albuminuria, diabetes insipidus, bronchorrhea, night-sweats, chronic diarrhea, and chronic cystitis, it is a most useful internal remedy.

Tannic Acid is a powerful astringent. It precipitates pepsin and coagulates albumin, impairs digestion, stops peristalsis, and causes constipation.

A part of that taken into the stomach unites with the pepsin and albumin, while a part is converted into gallic and pyrogallic acids, and in these forms it is both absorbed and excreted. It is a crystalloidal body, but combines with colloids, and is a valuable antidote in poisoning by the alkaloids and tartar emetic, with which it forms tannates which are nearly insoluble. Its continued use disorders digestion, irritates the mucous membranes, and produces emaciation. Injected into the veins it forms emboli and thus may cause death, but by the stomach it is non-toxic. Tannic Acid is a more powerful astringent than Gallic Acid, and hence it is preferred for local use and for astringent effect on the intestinal canal. It is well employed in hemorrhoids and hemorrhages from the lower bowel, in hematemesis, epistaxis, rectal ulcers or fissures, catarrhs and chronic affections of the mucous membranes, endocervicitis, conjunctivitis, dysentery and diarrheas, eczema, impetigo and other forms of skin-disease, otorrhea, bed-sores, prolapsus ani, and many other affections.

Styptic Collodion is used to stanch the bleeding from an open wound, to unite and protect incised or lacerated wounds, and to cover and change the character of foul ulcers.

Pyrogallic Acid has been absorbed from the surface with fatal results, preceded by vomiting, diarrhea, rigors, fever, a black urine charged with globulin and disintegration of the red blood-corpuscles. It has great affinity for oxygen and may be used as an antiseptic and disinfectant in 1 to 3 per cent. solutions. Externally as an ointment, 1 to 8 of lard, it is used in chronic psoriasis, lupus, leprosy, and epithelioma. Internally it has been administered in 2 grain doses for internal hemorrhages.

Tannalbin and Tannocoll are very similar in action and uses. They do not precipitate pepsin, coagulate albumin, or impair digestion. They pass through the stomach unchanged, and are resolved into their constituents by the alkaline secretions of the intestinal canal and the pancreatic juice, gradually setting free their tannin in the intestinal tract. They are free from irritant action on the stomach, and are valuable remedies in all forms of diarrhea in which astringents are indicated.

Tannoform is siccative, antiseptic, deodorant, and astringent. In 20 to 50 per cent. triturations with starch or talcum, it is used with benefit in many skin diseases, and for the night-sweats of phthisis. Internally it has given satisfaction in intestinal catarrh.

Oak-bark is astringent and tonic, but is seldom used internally. Its actions and uses are those of Tannic Acid. A decoction is much used in country practice as a cheap astringent application for injection in leucorrhœa, prolapsus ani, and hemorrhoids, and as a gargle in faucial inflammation and prolapsed uvula. It has also been used as an injection into dropsical cysts, and as a lotion for flabby ulcers and suppurating wounds. The powdered bark as a poultice has proved an excellent application in gangrene, and in finely pulverized state it is a useful ingredient of tooth-powders. A concentrated fluid extract was

used in the Heaton-Warren operation for the radical cure of hernia, by injection into the tissues around the margin of the ring, with the object of exciting inflammation and occlusion of the opening.

**ACIDUM HYDROCHLORICUM, Hydrochloric Acid, Muriatic Acid,**—is a liquid composed of about 32 per cent. of absolute Hydrochloric Acid Gas, HCl, and 68 per cent. of water. It is colorless and fuming, of specific gravity 1.163, pungent odor, intensely acid reaction and taste, and is obtained by the action of sulphuric acid upon sodium chloride, the resulting gas being carried through water, which dissolves it. It is sometimes used as a caustic. Its union with basic substances forms salts, called Hydrochlorides.

**Acidum Hydrochloricum Dilutum, Diluted Hydrochloric Acid,**—is a 10 per cent. solution by weight of the absolute acid in water. Dose, ℥iij—xx, [av. ℥xxv].

**Acidum Nitro-hydrochloricum, Nitro-hydrochloric Acid**—is described under ACIDUM NITRICUM.

*Incompatible* with Hydrochloric Acid are: Alkalies, Bromates, Carbonates, Chlorates, Lead salts, Mercurous salts, Oxides, Permanganates, Silver salts, Tartar Emetic.

#### PHYSIOLOGICAL ACTION OF THE MINERAL ACIDS.

The mineral acids, including hydrochloric, nitric, nitro-hydrochloric and sulphuric acids, resemble each other closely in their general action. These strong acids are escharotic, abstracting water from the tissues, combining with their albumin, and destroying the protoplasm. Sulphuric Acid has a strong affinity for water, completely decomposing the tissue, and is therefore the most powerfully escharotic. Nitric Acid does not readily redissolve the albumin precipitated by it, which thus forms a barrier against the deep action of the acid. Sulphuric Acid chars or carbonizes the tissues black, while Nitric and Hydrochloric tan them yellow.

Acute poisoning by the mineral acids has for its principal symptoms pain in the mouth, gullet, and epigastrium, violent vomiting, and rapid collapse characterized by cold perspiration, feeble pulse, and suppressed voice. After death the esophagus and stomach are found to be corroded, the lesions showing sloughs of black color after sulphuric acid, of yellow color after nitric or hydrochloric acids. If death does not take place early, the internal organs show wide-spread degeneration of their protoplasm, and desquamative nephritis has been frequently observed. In cases of recovery prolonged illness from local organic changes is the usual result.

In dilute preparations these acids produce a sour taste in the mouth and a sensation of roughness on the teeth. They stimulate the flow of saliva, bile, and the intestinal secretions, but decrease the production of the gastric juice; in accordance with the somewhat doubtful rule that acids in contact with the mouths of ducts from glands stimulate the action of those glands which produce alkaline secretions, and check that of those producing acid secretions. Nitrohydrochloric Acid is an efficient cholagogue, a quality possessed also, but in less degree, by the others. Secretion generally is promoted by Nitric

and Hydrochloric Acids, and is lessened by Sulphuric Acid, which is the most astringent of the three. In small doses given before meals they aid digestion, by synergizing the action of the pepsin, but if long continued they will impair digestion by lessening the production of the gastric secretions. Hydrochloric Acid is the normal digestive acid of the stomach, existing in the gastric juice in the proportion of 0.2 per cent. These acids check fermentation and constipate the bowels, except Nitric Acid, which relaxes them. They render the urine slightly more acid than its normal reaction, but will not acidify an alkaline urine as the vegetable acids do. In the blood they exist as salts which are rapidly excreted by the kidneys. Phosphoric Acid is described under the title PHOSPHORUS.

#### THERAPEUTICS OF THE MINERAL ACIDS.

All the members of this group are useful in fevers, if well diluted, Hydrochloric being usually preferred, especially in typhoid. In atonic dyspepsia, acidity of the stomach, and locally in ulcerations of the throat, Hydrochloric Acid is best used. Nitric is the acid generally preferred as a caustic, its action being effectual and superficial. As such it is applied undiluted to phagedenic ulcers and sloughs, warty growths, and to the cavity of the womb in chronic endometritis. Dilute Nitric Acid is used internally in oxaluria and lithemia, intermittent and remittent fevers, and aphonia of singers. Dilute Nitro-hydrochloric is more suitable for chronic hepatic disorders due to malaria; Sulphuric in hemorrhages, diarrheas, colliquative sweating, and as a prophylactic against lead-poisoning. Dilute Sulphuric Acid is used as an acid drink in fevers, and before meals in acidity of the stomach. It is very doubtful whether the latter has any special influence on the nervous or osseous systems.

All these acids act injuriously on the teeth, by attacking the enamel. They should always be largely diluted, taken through a straw or glass tube, and the mouth should be thoroughly rinsed at once with an alkaline wash.

**ACIDUM HYDROCYANICUM, Hydrocyanic Acid, Prussic Acid, HCN,**—is a colorless, unstable, inflammable liquid, soluble in water and in alcohol, very volatile, and so toxic that death has resulted from smelling it. It is never found outside the chemical laboratory, and is official only in the dilute form—

**Acidum Hydrocyanicum Dilutum, Diluted Hydrocyanic Acid,**—a liquid composed of 2 per cent. by weight of absolute Hydrocyanic Acid, HCN, and 98 per cent. of water. It is colorless, faintly acid, of peculiar odor, and is prepared by distilling solutions of potassium ferrocyanide and sulphuric acid together, or extemporaneously by adding 6 grammes of silver cyanide to a solution of 15.54 Cc. of diluted hydrochloric acid in 44.10 Cc. of distilled water, shaking together and pouring off the supernatant liquid. ℥xl have proved fatal. Dose, ℥j—iij, [av. ℥jss] of a recent preparation; as, even under the most favorable conditions, it will decompose within a year.

*Preparations containing Hydrocyanic Acid.*

**Aqua Laurocerasi**, *Cherry-laurel Water* (Unofficial),—is a water distilled from the fresh leaves of *Prunus laurocerasus*, the common Laurel or Cherry Laurel, a small tree of the nat. ord. Roseacæ, sub-order Amygdaleæ. The leaves contain a variable amount of Hydrocyanic Acid and a volatile oil. Dose,  $\text{m}\bar{\text{v}}$ – $\text{xxx}$ , cautiously.

**Scheele's Dilute Hydrocyanic Acid** (Unofficial),—is a 4 or 5 per cent. solution, and is highly dangerous even by inhalation.

**Amygdala Amara**, *Bitter Almond* (see its title) and its essential oil; also various other members of the sub-order Amygdaleæ, including the official *Prunus Virginiana*, perhaps the unofficial *Prunus laurocerasus*, and the leaves and kernel of the peach and cherry trees, contain a proximate principle *Amygdalin*, and a ferment *Emulsin*, which in the presence of water react on each other, forming Hydrocyanic Acid, a volatile oil, and glucose.  $\text{C}_{20}\text{H}_{27}\text{NO}_{11}$  (*Amygdalin*)— $2\text{H}_2\text{O} = \text{C}_7\text{H}_6\text{O}$  (Oil of Bitter Almond) +  $\text{HCN}$  (Hydrocyanic Acid) +  $2\text{C}_6\text{H}_{12}\text{O}_6$  (Glucose).

Hydrocyanic Acid exists ready formed to a considerable extent in the juice of the bitter cassava.

*Other Cyanogen Compounds.*

**Potassii Cyanidum**, *Potassium Cyanide*,  $\text{KCN}$ ,—a white, opaque salt, of alkaline reaction, bitter-almond taste, and a peculiar odor when moist; soluble in 2 of water, sparingly soluble in alcohol. Dose, gr.  $\frac{1}{20}$ – $\frac{1}{2}$  [av. gr.  $\frac{1}{3}$ ]. Locally a solution of gr. j–v to the  $\bar{\text{z}}$  is as strong as should be employed.

**Potassii Ferrocyanidum**, *Potassium Ferrocyanide*,  $\text{K}_4\text{Fe}(\text{CN})_6\text{H}_2\text{O}$ ,—large, lemon-yellow prisms or tablets, efflorescent, odorless, of sweetish taste and neutral reaction, soluble in 4 of water, insoluble in alcohol. Employed in pharmacy as a test solution, and in the preparation of Iron Ferrocyanide, Diluted Hydrocyanic Acid and Potassium and Silver Cyanides. Rarely used medicinally. Dose, gr. v–xv, [av. gr. vijss].

*Incompatibles.*

Incompatible with *Hydrocyanic Acid* are: Acids (mineral), Antimony Oxides, Iron and Copper salts, Mercury Oxides, Silver Nitrate, Sulphides; with *Cyanides* are: Acids, Alkalies, Hydrated Chloral, Iodine; Lead, Mercurous, and Silver salts; Permanganates, Potassium Chlorate, Potassium Nitrate. Atropine is physiologically incompatible.

## PHYSIOLOGICAL ACTION.

Hydrocyanic Acid is one of the most powerful and rapid poisons known, half a grain having proved fatal almost immediately. Its action on the organism is one peculiar to itself, the inhalation of a strong preparation producing rapid insensibility and almost immediate exhaustion;—death from a full dose occurring by sudden paralysis of the heart, from a less but still a fatal dose, by paralysis of respiration. The symptoms are those of sudden and complete asphyxia, but some volitional movements may be made before death, unless the dose be very large. In cases in which the dose, though fatal, permitted of the observance of its effects, they were usually divisible into two marked stages, (1) dyspnea, slow and full pulse, giddiness, loss of muscular power; (2) vomiting, dilated pupils, unconsciousness, spasms, muscular rigidity, and cessation of the heart's action. In poisonous, but not fatal doses, the following effects have been observed: feeble pulse, dilated pupils, turgid and dusky face, insensibility, convulsions or rigidity, but no paralysis. Large medicinal doses may produce salivation, irritation of the throat, dizziness, buzzing in the ears, headache, numbness, dusky countenance, staggering gait, sense of constriction in the chest, palpitation of the heart, a frequent or an

abnormally slow pulse, a sense of great weariness and drowsiness. Post-mortem examination usually shows dilated pupils, the eyes having a marked glassy lustre, the cadaveric rigidity very great. The blood, in cases which have been rapidly fatal, may show the arterial color in both the arterial and the venous systems; but in slower cases it is dark and fluid, engorging both sides of the heart, the venous trunks, and the cerebral sinuses. The paralyzant action of the drug is chiefly exercised on the nerve-centres in the medulla; next on the peripheral afferent nerves, the spinal cord, the motor nerves, and finally on the muscular tissue. It stops the heart by irritation of the vagus-roots in the medulla, as well as by paralyzing the cardiac motor ganglia. It is said to form with hemoglobin a compound (cyan-hemoglobin), which does not readily give up oxygen. The odor of the acid is fragrant, resembling that of bitter almonds or peaches, and may be detected in the lungs shortly after death. The effects of a medicinal dose pass off in an hour at the farthest.

Locally applied to the skin, Hydrocyanic Acid penetrates the epidermis and paralyzes the end-organs of the sensory nerves in the derma. It is rapidly absorbed from mucous surfaces.

Potassium Cyanide has similar action, but in addition has some few peculiar to itself. Locally used it produces dermatitis, with an eczematous eruption, and if applied to an abraded surface freely may cause fatal effects. Internally it has proved fatal in doses of 3 to 5 grains, with all the symptoms of hydrocyanic acid poisoning, but its action is less rapid. In the stomach it is converted into hydrocyanic acid by the displacement of K by H in the presence of an acid. As the amount of acid in the stomach is small, this reaction proceeds gradually, and there is generally an interval of several minutes, up to 15 or 20, before the onset of toxic symptoms, which are much less violent than those from hydrocyanic acid, and the tetanic convulsions of the latter agent may be entirely absent, but the result is no less fatal. This Cyanide is much used in photography, and many cases of poisoning by it have occurred in persons employed in that art.

## THERAPEUTICS.

Diluted Hydrocyanic Acid is used for its antispasmodic and sedative effects. In vomiting, whooping-cough, and coughs of spasmodic character, in asthma and other neuroses of the respiratory organs, in affections involving the pneumogastric nerve, vertigo and headache from stomachal derangements, gastralgia, painful dyspsia, and vomiting, it is very efficient as a palliative. In acute mania and melancholia it has been used with advantage; and in various skin diseases, accompanied by itching and tingling, its use as a lotion ( $\text{m}\bar{\text{xxx}}$ – $\bar{\text{z}}$  ad  $\bar{\text{z}}$   $\text{aq}\bar{\text{u}}\bar{\text{e}}$   $\text{ros}\bar{\text{a}}$ ) to the unbroken surface, promptly relieves the pruritus and other distressing sensations. Being rapidly eliminated it requires frequent administration for its effects to be of service.

Potassium Cyanide in ointment (gr. v ad  $\bar{\text{z}}$  j) is used to allay pruritus, and in solution (gr. iij–v ad  $\bar{\text{z}}$  j) is applied locally with benefit in reflex headaches and is used as a wash to remove nitrate of silver stains. It has been used in-

ternally in doses of gr. j for acute articular rheumatism, but such employment of it is highly dangerous. In smaller doses (gr.  $\frac{1}{8}$ – $\frac{1}{4}$ ), it is a useful ingredient of cough mixtures, where opium or its alkaloids are not admissible.

Potassium Ferrocyanide has been used in doses of 8 to 15 grains as an astringent and anodyne, but it is seldom employed in medicine.

Cherry-laurel water has been extensively used as a flavoring agent, having a very agreeable taste. It is official in the British Pharmacopœia, and is supposed to be a rather elegant mode of administering prussic acid; but the uncertainty of its strength is such that it should never be used internally, except in very small quantities. It has been employed as an anesthetic injection into the urethra prior to catheterization, and was formerly employed by ophthalmologists as an eye-wash in painful affections of that organ.

**ACIDUM LACTICUM, Lactic Acid**,—is a liquid composed of 75 per cent. by weight of absolute Lactic Acid,  $\text{HC}_3\text{H}_5\text{O}_3$ , and 25 per cent. of water; nearly colorless, syrupy, odorless, of acid taste and reaction, freely miscible with water, alcohol and ether, but nearly insoluble in chloroform. It is produced by the lactic fermentation of sugar of milk or grape sugar, has a sp. gr. of 1.213, and is difficult to obtain pure. It enters into Syrupus Calci Lactophosphatis. Dose,  $\text{℥xx}$ – $\text{ʒj}$ ; [av.  $\text{℥xxx}$ .], well diluted.

Lactic Acid is found in the stomach as a product of the food, and combines with bases in the blood, forming lactates, which, being oxidized, are converted into carbonates. It aids digestion and promotes the appetite, but in large doses causes flatulence and much epigastric pain. Injected into the peritoneal cavity of animals, it excites endocarditis, and given in diabetes it has produced acute rheumatism and rheumatic endocarditis. Hence its supposed causation of acute rheumatism when in excess and free in the blood. It dissolves false membranes and also calcium phosphate. Hypnotic properties have been ascribed to it.

Lactic Acid is used with benefit in diabetes, atonic dyspepsia, oxaluria, and in the lithic and phosphatic diatheses, when due to imperfect digestion and assimilation. As a solvent and phosphatic membrane in diphtheria it is unquestionably of great service but painful. In chronic cystitis it arrests the ammoniacal decomposition in the urine. As the acid found in the shops is generally of poor quality, disappointment in its use may be expected. Albumin, milk, and oxidizers, are incompatible with Lactic Acid.

**ACIDUM NITRICUM, Nitric Acid**,—is a liquid composed of 68 per cent. by weight of absolute Nitric Acid,  $\text{HNO}_3$ , and 32 per cent. of water. It is colorless, fuming, very caustic and corrosive, of sp. gr. 1.414, strongly acid in reaction, and is obtained by the action of sulphuric acid on potassium nitrate. It is only used externally as a caustic.

#### Preparations.

**Acidum Nitricum Dilutum, Diluted Nitric Acid**,—has of the above 10 grammes in 58 of Distilled Water, and contains 10 per cent. by weight of absolute Nitric Acid. Dose,  $\text{℥ij}$ – $\text{xl}$ ; [av.  $\text{℥xxx}$ .], well diluted.

**Acidum Nitrohydrochloricum, Nitrohydrochloric Acid, (Nitromuriatic Acid, Aqua Regia)**—a golden yellow, fuming, corrosive liquid, composed of Nitric Acid 18 vols., Hydrochloric Acid 82 vols. Is wholly volatilized by heat, usually dissolves gold-leaf, and a drop added to test-solution of potassium iodide liberates Iodine in abundance. Dose,  $\text{℥j}$ – $\text{vii}$ ; [av.  $\text{℥ij}$ .], well diluted.

**Acidum Nitrohydrochloricum Dilutum, Diluted Nitrohydrochloric Acid**,—consists of Nitric Acid 4, Hydrochloric Acid 18, Water 78 vols. Dose,  $\text{℥v}$ – $\text{xx}$ ; [av.  $\text{℥xv}$ .], well diluted.

#### Incompatibles.

Incompatible with *Nitric Acid* are: Alcohol, Alkalies, Carbonates, Ferrous Sulphate, Lead Acetate, Oils (essential), Sulphides.

#### PHYSIOLOGICAL ACTION AND THERAPEUTICS.

The action and uses of these agents are described with those of the other mineral acids, under the title **ACIDUM HYDROCHLORICUM**. Some special properties are as follows:—

Nitric Acid is an exceedingly powerful escharotic, but, as it coagulates and does not redissolve the albumin of the tissues, it forms a barrier to its own excessive action. The vapor may cause edema of the glottis, intense bronchitis, and death from suffocation. It is used for the destruction of chancres, warts, hemorrhoids, phagedenic ulcers, etc.; and internally in dilute form for bilious affections, as it is somewhat cholagogue in its action on the liver. It is excreted to a small extent as ammonia, slightly decreasing the acidity of the urine and lessening phosphatic deposits therein. It is one of the principal tests for determining the presence of albuminuria.

Nitrohydrochloric Acid is an efficient cholagogue, and is employed with benefit in jaundice, dyspepsia, and the so-called bilious condition; also in acidity of the stomach and in frontal headache situated just above the eyebrows when unaccompanied by constipation. In hepatic disorders it may be used in dilute form as baths, or applied to the hepatic region on compresses. The official dilute acid is of little use therapeutically, as it rapidly deteriorates, and the same is true of the strong acid when old enough for the color to change to a lemon-yellow. The most efficient is the strong acid freshly prepared, which is of an orange-red color. This should be properly diluted when required for use, and should be constantly protected from light.

**ACIDUM OLEICUM, Oleic Acid,  $\text{HC}_{18}\text{H}_{33}\text{O}_2$** ,—is one of the constituent acids of oils and fats, obtained commercially as a secondary product in the manufacture of stearin candles. It is a yellowish, oily liquid, semi-solid at 40° F., odorless, tasteless, and of neutral reaction, insoluble in water but soluble in alcohol, chloroform, benzol, benzin, turpentine, and the fixed oils. It dissolves most of the metallic oxides and the uncombined alkaloids, forming the so-called Oleates, which, however, are not pure chemical compounds, but merely compounds of an oxide or an alkaloid, as the case may be, with oleic acid, dissolved in a great excess of the latter. Five of these are official, viz.—

- Oleatum Atropinæ, Oleate of Atropine**,—strength 2 per cent.
- Oleatum Cocainæ, Oleate of Cocaine**,—strength 5 per cent.
- Oleatum Hydrargyri, Oleate of Mercury**,—strength 25 per cent.
- Oleatum Quininæ, Oleate of Quinine**,—strength 25 per cent.
- Oleatum Veratrinæ, Oleate of Veratrine**,—strength 2 per cent.

#### Unofficial Preparations.

**Oleates (Oleata) of Aconitine** (2 per cent.), **Morphine** (10 per cent.), **Morphine and Mercury** (2 per cent. morphine and 20 per cent. mercuric oxide), **Strychnine** (2 per cent.), **Arsenic** (gr. xx of arsenic oleate to the  $\text{ʒ}$ ), **Aluminum, Bismuth, Copper, Iron, Lead, Silver**, etc., are prepared by the manufacturing pharmacists, and are to be obtained in the shops. Most of them answer to the description given above, but several are Oleo-palmitates, or double salts of Oleic and Palmitic Acids, being prepared from oils which yield the latter acid in considerable quantity. Drs. Shoemaker and Wolff, of Philadelphia, have introduced,

under the above names, several solid or semi-solid preparations, which they claim to be chemically true oleates, salts having no excess of either their acid or basic radicles. They are produced by the double decomposition of sodium oleates with solutions of neutral salts, the precipitates, washed and dried, being the oleates required. These oleates are claimed to be more stable than the official oleic solutions, and having less oleic acid are much less costly. Many of them may be used as dusting powders, or mixed with oil or lard to form ointments.

Oleic Acid is used only in making the oleates, which were introduced by Marshall as substitutes for ointments, being cleaner, more elegant, and more penetrating, but decidedly more irritating if applied with friction. Their medicinal properties depend upon the bases employed, hence their actions and uses will be described under the corresponding basic titles. As parasitocides, the Oleates of Copper and Mercury are most efficient, and in skin diseases generally these preparations are rapidly gaining favor.

**ACIDUM OXALICUM, Oxalic Acid,  $C_2H_2O_4$ ,** (Unofficial),—is an organic acid which exists as oxalates in many plants, particularly rhubarb, spinach, and those of the genus *Rumex*, commonly called "sorrel." It may be prepared by the oxidation of sugar, starch, or many organic substances, by Nitric Acid, or by fusing sawdust with a mixture of potassa and soda. It occurs in small, colorless crystals, which are soluble in 10 of water and in  $2\frac{1}{2}$  of alcohol. Dose, gr.  $\frac{1}{8}$ – $\frac{1}{2}$ , but the latter amount has caused serious respiratory depression.

**Acid Potassium Oxalate, Salt of Sorrel, Salt of Lemons** (Unofficial),—is used in households for removing ink and iron stains, cleaning brass, etc. It is nearly as toxic as the acid.

**Ferri Oxalas, Ferrous Oxalate** (Unofficial),—a ferruginous salt, highly esteemed by Hayem. Dose, gr. j–ijj.

**Ammonii Oxalas, Ammonium Oxalate,**—is official as a test-solution for calcium salts.

**Cerii Oxalas, Cerium Oxalate,**—is described under its own title.

*Incompatible* with Oxalic Acid and the Oxalates are: Arsenates, Metallic Salts, except those of aluminum, chromium, and magnesium.

#### PHYSIOLOGICAL ACTION AND THERAPEUTICS.

Oxalic Acid derives its importance from its frequent use as a poison. It is largely used in the arts, for bleaching and dyeing, also in households for cleaning brass and removing ink and iron stains, and has often been mistaken for Epsom salts, which it resembles in appearance. It is a rapid and powerful poison, causing burning pain in the throat and abdomen, vomiting of acid, greenish or bloody mucus, a small and irregular pulse, collapse, stupor, sometimes convulsions, and death from paralysis of the respiration. In some cases the nervous symptoms mask the gastric effects entirely, so that the patient may suddenly fall unconscious immediately after the ingestion of the poison. Death has occurred from ʒj (Taylor), but recovery has occurred after ʒiv (Murrell). It paralyzes the respiratory, vaso-motor, and other spinal motor centres, also the heart, which is arrested in systole. It is eliminated by the kidneys and produces glycosuria; is emmenagogue and abortifacient, and a powerful germicide. It is probably a constant product of metabolism, traces of calcium oxalate being

found in normal urine, and occurs in excess (oxaluria) in that of many hypochondriac and gouty subjects. It has been used medicinally in the treatment of amenorrhœa, as a sedative in acute cystitis, and in connection with Potassium Permanganate for disinfecting the hands of the surgeon.

**ACIDUM SULPHURICUM, Sulphuric Acid,**—is a strongly caustic and corrosive liquid, oily, inodorous, of strongly acid reaction, and is composed of not less than  $92\frac{1}{2}$  per cent. of absolute Sulphuric Acid,  $H_2SO_4$  and  $7\frac{1}{2}$  per cent. of water. It is obtained from the combustion of Sulphur and its oxidation by nitrous fumes. Its specific gravity should not be below 1.835, and it is miscible in all proportions with water and alcohol, with evolution of heat. Being dibasic it forms both acid and normal salts (sulphates) with monad bases. It decomposes many organic substances, extracting their H and O in the proportion to form water, and leaving the carbon behind.

**Acidum Sulphuricum Dilutum, Diluted Sulphuric Acid,**—has of the strong acid 1 part to  $8\frac{1}{2}$  of distilled water, and contains 10 per cent. by weight, of absolute sulphuric acid. Dose,  $\mathfrak{v}$ –xl, [av.  $\mathfrak{mxxx}$ ], well diluted.

**Acidum Sulphuricum Aromaticum, Aromatic Sulphuric Acid, Elixir of Vitriol,** is Sulphuric Acid 11 per cent. by volume, 20 per cent. by weight, diluted with Alcohol and flavored with Cinnamon and Ginger. It is not an acid, but rather an ether formed by reaction between the acid and the alcohol. Dose,  $\mathfrak{v}$ –xx, [av.  $\mathfrak{mxxv}$ ], well diluted.

*Incompatible* with Sulphuric Acid are: Alcohol, Barium and Calcium salts. Hypophosphorous Acid, Metals, Oils (essential); Lead, Mercurous, Silver and Strontium salts, Organic substances, Sulphides, Vegetable astringent infusions.

The actions of Sulphuric Acid are described with those of the other mineral acids under the title Acidum Hydrochloricum. Its principal uses are those of an astringent and a hemostatic, though it is occasionally employed as a caustic. Internally it is used in lead-poisoning to form the insoluble sulphate of lead, also as a remote astringent in diarrhea, hemorrhoids, hemorrhages, night-sweats, and mucous discharges. In choleraic diarrhea and lead-poisoning it is generally administered in combination with opium. The only hemorrhages in which it is efficient are those from mucous surfaces. It is excreted chiefly by the kidneys, part escaping by the bowels as sulphates, part also by the skin. Like the other mineral acids, it does not increase the acidity of the urine to any considerable extent.

**ACIDUM SULPHUROSUM, Sulphurous Acid,**—is a colorless liquid of sulphurous taste and highly acid reaction, composed of not less than 6 per cent., by weight, of Sulphur Dioxide,  $SO_2$ , and 94 per cent. of water. It is prepared by heating Sulphuric Acid with charcoal and dissolving the evolved gas in distilled water. Dose,  $\mathfrak{v}$ –ʒj, [av.  $\mathfrak{mxxx}$ .] largely diluted with water. Its salts are the Sulphites and Hyposulphites.

**Sodii Sulphis, Sodium Sulphite,  $Na_2SO_3 \cdot 7H_2O$ ,**—colorless, transparent, monoclinic prisms, efflorescent in dry air, of cooling, saline, and sulphurous taste, and neutral or feebly alkaline reaction; soluble in 4 of water and in 0.9 of boiling water, very slightly soluble in alcohol. Dose, gr. v–xxx or even up to ʒj, [av. gr. xv.]

**Sodii Bisulphis**, *Sodium Bisulphite*,  $\text{NaHSO}_3$ .—opaque prismatic crystals, of faint, sulphurous odor, a disagreeable taste, and acid reaction; soluble in 4 of water and in 72 of alcohol, in 2 of boiling water, and in 49 of boiling alcohol. By strong heat it is converted into sulphur and sulphate of sodium. Dose, gr. iij–xx, [av. gr. vijss.]

**Sodii Thiosulphas**, *Sodium Thiosulphate*, (*Sodium Hyposulphite*),  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ .—large, colorless, monoclinic prisms or plates, efflorescent in dry air, of cooling and bitter taste, and neutral or faintly alkaline reaction; soluble in 1.5 of water and in 0.5 of boiling water, which partly decomposes it; insoluble in alcohol. Dose, gr. v–xx, [av. gr. xv.]

*Incompatibles.*

Incompatible with *Sodium Hyposulphite* are Acids, Chromates and Permanganates in acid solution, Chlorates, Iodine, Nitrates, Oxidizers; Salts of Barium, Lead, Silver; Arsenic, Ferric and Mercurous salts. All oxidizers change the *Sulphites* into sulphates, and the mineral Acids decompose them.

Sulphurous Acid Gas (sulphur dioxide) is extensively used as a disinfectant, being the most powerful and convenient agent for this purpose. Sulphur is burned on a shovel or plate in the room to be fumigated, all outlets having been carefully closed. The gas is injurious to many fabrics, is irritant to the respiratory mucous membrane, and inhaled may cause dangerous inflammation of the glottis. Sulphurous Acid has a powerful affinity for oxygen, is strongly disinfectant and deodorant, and very destructive to all plant and animal life. It is used as a spray or by a mop locally in many affections of the throat, and in diphtheria, stomatitis, aphthæ, ulcers of the tonsils, syphilitic and tuberculous laryngitis, and chronic bronchitis, it may be thus applied with great benefit. Morbid fermentation in the stomach, with growth of penicillium and sarcinae, is quickly stopped by 5 to 60-minim doses in water, or by the sulphites in 20-grain doses. In parasitic skin diseases and foul wounds these agents are extremely useful as local applications.

The Sulphites and Hyposulphites are partly decomposed by the acid of the stomach, sulphurous acid being given off, and the balance being converted into sulphates act as purgatives, and are absorbed, undergoing elimination as sulphates by the kidneys and bowels. They were formerly supposed to enter the blood and tissues as sulphites, and to arrest morbid processes of the zymotic character, but both these assumptions have proven erroneous. The Sulphites were formerly used in zymotic and septic fevers as internal antiseptics on theoretical grounds, but their supposed value has not been realized.

**ACIDUM TARTARICUM**, *Tartaric Acid*,  $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$ .—is a dibasic organic acid, prepared from Potassium Bitartrate by neutralizing a solution thereof with chalk and calcium chloride, then decomposing the calcium tartrate thus formed by sulphuric acid, evaporating and purifying. It occurs in colorless, transparent prisms, which are odorless, of acid taste and reaction, and soluble in 0.8 of water and in 2½ of alcohol at 59° F. Twenty grains exactly neutralize 27 of Potassium Bicarbonate, 22 of Sodium Bicarbonate, or 15½ of Ammonium Carbonate. Dose, gr. v–xx, [av. gr. vijss.]

Tartaric Acid is an ingredient of the Effervescing Powder (see under POTASSIUM). Six Tartrates and one Bitartrate (see Index) are official, and are described, with their actions and uses, under the titles of their respective bases. For *Potassium Bitartrate* see under POTASSIUM. The *Alkaline Cupric Tartrate Volumetric* (Fehling's) *Solution* is described under the title FERRUM.

*Incompatible* with Tartaric Acid are: Alkalies, Calcium salts, Carbonates, Lead salts, Lime-water, Mercury salts, Vegetable astringents.

The actions and uses of Tartaric Acid are similar to those of the other vegetable acids, as described under ACIDUM ACETICUM. It is chiefly employed in the preparation of effervescing refrigerant drinks and effervescing granulated salts.

**ACONITUM**, *Aconite*,—is the dried tuberous root of *Aconitum Napellus*, the Monk's-hood or Wolf's-bane, a perennial plant of the nat. ord. Ranunculaceæ, found in mountainous regions of Europe, Asia and N. America. This plant has deep-blue, helmet-shaped flowers, and leaves which have deeply-cut, wedge-shaped segments, exciting slowly when chewed a sensation of tingling in the tongue and lips. The root is conical and tapering, with a thick bark enclosing a seven-rayed, star-shaped pith, odorless, taste sweetish at first, soon becoming acrid. A minute portion, cautiously chewed, causes prolonged tingling and numbness of the tongue and lips. Aconite contains the alkaloids *Aconitine*,  $\text{C}_{34}\text{H}_{47}\text{NO}_{11}$ , *Benzaconine*,  $\text{C}_{25}\text{H}_{39}\text{NO}_{11}$ , and *Aconine*,  $\text{C}_{22}\text{H}_{35}\text{NO}_9$ ; also Aconitic Acid, gum, sugar, etc. Dose, gr. ¼–ij, [av. gr. j.]

*Aconitine* may be considered an acetyl-benzaconine, as it is resolvable into benzaconine and acetic acid. *Benzaconine* may be resolved into aconine and benzoic acid. *Aconine* and *Benzaconine* are the principal constituents of the *Napelline* and *Picraconitine* of older writers (Cash and Dunstan).

Other Aconites are: *Aconitum Ferox*, from India, yielding the alkaloid *Pseudaconitine*, which is even more toxic than Aconitine; *Aconitum Japonicum*, from Japan and China, containing *Japaconitine*, which is identical with Aconitine; *Aconitum Lycoctonum*, the alkaloid of which is called *Lycoctonine*. The plant *Delphinium Staphisagria* contains an alkaloid named *Delphinine*, which acts similarly to Aconitine, but less powerfully.

*Official Preparations.*

**Fluidextractum Aconiti**, *Fluidextract of Aconite*,—an alcoholic preparation of which each drop represents nearly one grain of the powdered drug. Dose, ʒj–ij, [av. ʒj.]

**Tinctura Aconiti**, *Tincture of Aconite*,—has of Aconite 10, Alcohol and Water to 100. Dose, ʒj–xv, [av. ʒxx.]

Tinctures of Aconite-root vary greatly in strength. In Fleming's Tincture 79 parts of aconite are used in preparing 100 of the tincture, in that of the B. P. 5, in the French 20, the German 10, while the Linimentum Aconiti (B. P.) is really a very strong tincture, of the strength of 1 to 1½. Probably the best and safest preparation for ordinary use is a 10 per cent. tincture, of which the maximum single dose for an adult is stated in the P. Ger. at ʒxxxv, and the maximum daily dose at ʒxxxv.

The best rule for the administration of Aconite is to give minim doses of the official tincture every 15 minutes until the desired effect is produced.

**Aconitina**, *Aconitine*,  $\text{C}_{34}\text{H}_{47}\text{NO}_{11}$ .—is a white, prismatic powder, readily soluble in alcohol or chloroform, nearly insoluble in water. It is difficult to obtain it of constant strength, some samples being nearly inert, others extremely active. As it occurs commercially it is a mixture of several alkaloids, and should not be used internally in practical medicine (Wood). The *Aconitine Crystallisée* of Duquesnel is a nitrate of aconitine, and is probably the most active preparation on the market (Squibb). Dose, gr. ʒj–ʒj, [av. gr. ʒj]; but the amorphous Aconitine may be administered in doses of gr. ʒj–ʒj (Merck).

*Unofficial Preparations.*

**Oleatum Aconitinæ**, *Oleate of Aconitine*,—is a 2 per cent. solution in Oleic Acid, for external use. Duquesnel's crystals will not dissolve in Oleic Acid (Squibb).

**Napellina**, *Napelline*,—contains Benzaconine and Aconine, and has been used in doses of gr. ʒj–ʒj. It has been studied by Laborde, who claims for it most valuable hypnotic properties, and proposes to use it as a substitute for opium and chloral.

**St. Jacob's Oil** (a patent medicine),—is a weak Aconite Liniment, which also contains Ether, Alcohol, Turpentine, red coloring matter and water (Squibb). It contains Turpentine (82 per cent.), Aconite, Ether, Alcohol, Carbolic Acid, Capsicum and a small quantity of Origanum (Murrell).