

at 60°, and in two parts of boiling water; and undergoes the watery fusion when heated. Its constituents, according to Thenard, are, in 100 parts, 19 of soda, 15 of phosphoric acid, and 66 of water; and according to Berzelius 20.33 of acid; 17.67 of base, and 62.80 of water. Muriate of barytes, lime, and magnesia, decompose this salt; and by the strong acids it is converted into superphosphate of soda.

Medical properties and uses. — Phosphate of soda is a mild cathartic, excellently adapted for children, and others who have a fastidious taste. It may be given dissolved in gruel, or broth, made without salt, by which its taste is very effectually covered. The dose is from ʒvj to ʒij. It was introduced into practice by Dr. George Pearson of London.

MURIAS SODÆ SICCATUM. Dub.* *Dried muriate of Soda.*

“Take of muriate of soda, *any quantity*. Roast it over the fire in an iron vessel slightly covered, until it cease to decrepitate, occasionally agitating.”

One hundred parts of crystallized muriate of soda contain, according to Kirwan, 8.12 of water, which is nearly dissipated by the heat; and the salt is thus rendered of a more uniform strength. It is employed chiefly for the distillation of muriatic acid, which is obtained colourless from the dried salt.

EARTHS AND EARTHY SALTS.

EARTHS possess peculiar properties, which distinguish them from other bodies, and constitute them a distinct class of natural productions. They are opaque, solid, unflammable, of very difficult fusibility, very sparingly soluble in water, and of a specific gravity not exceeding 4.9. Some of them resemble the alkalies in several particulars; are caustic, change to green the vegetable blues and reds, and neutralize acids; and have therefore been denominated **ALKALINE EARTHS**. Of this division three are medicinally employed; namely, **LIME**, **MAGNESIA**, and **BARYTES**; but the two former only are used as remedies in their pure state. Those earths which do not possess alkaline properties are denominated **PROPER EARTHS**; of which one only, **ALUMINA**, is a medicinal agent; and it is not used in its uncombined state.

Although some of the old chemists conjectured that the pure earths were metallic oxides, yet no direct proofs in support of the supposition were obtained, and they were generally

* Muriate de Soude sec (F.) Getrocknetes salzsaures Natrum (G.) Muriato di Soda secco (I.)

supposed to be simple bodies, until the discoveries of Sir H. Davy revived the idea of their metallic nature.

The action of the pure earths on the animal economy is very similar to that of the alkalies.

The EARTHY SALTS¹ are compounds of the acids with the pure earths, resembling the salts formed by the combination of acids with alkalies. Some of them are crystallizable, and soluble in water; others are nearly insoluble: some of them exert scarcely any action on the animal economy; while others are possessed of great activity, and produce very striking effects.

In extemporaneous prescription, it is absolutely necessary to avoid combining the earths or earthy salts with substances with which they form insoluble compounds.

The following Table shows the solubility of the above earths, and of the compounds which they form with acids.

PURE EARTHS.	Solubility in one part of Water.	ACIDS which, in combination with these Earths, form		
		Soluble Compounds.	Compounds scarcely soluble.	Insoluble Compounds.
Lime.....	0.002	Nitric Muriatic Acetic Benzoic Malic	Sulphuric Boracic Succinic Tartaric	Oxalic Phosphoric Carbonic Arsenic
Magnesia	0.000	Sulphuric Phosphoric Nitric Muriatic Carbonic Acetic Benzoic Succinic Malic	Tartaric	Boracic Oxalic
Barytes...	0.050	Nitric Muriatic Acetic Benzoic Tartaric	Succinic Carbonic Citric	Sulphuric Oxalic Phosphoric Boracic Arsenic
Alumina.	0.000	Sulphuric Nitric Muriatic Carbonic Acetic Benzoic Oxalic Tartaric	Boracic	Phosphoric Arsenic

¹ We prefer the title *Earths and Earthy Salts* to that of *Earths and their Salts*, which

ALUMEN EXSICCATUM. Lond.¹ *Dried Alum.*

"Melt alum in an earthen vessel over the fire, and increase the heat until the ebullition cease."

Edinburgh.

"Melt the alum in an earthen or iron vessel, and let it be kept over the fire until it cease to boil: then rub it into a powder."

ALUMEN USTUM. Dub. *Burnt Alum.*

"Take of alum *any quantity*. Expose to the heat of a strong fire in an earthen vessel until it cease to boil."

In these processes the alum loses its water of crystallization; but if the heat be too great, its acid is partly expelled, and partially decomposed. According to Kirwan, alum desiccated at 700° loses more than half its acid. By our experiments, English alum lost 0.43 in a moderate heat, and 0.46 in a red; Levant alum, 0.41 in a moderate heat, and 0.44 in a red heat. Chaptal found that in a red heat alum of his own manufacture lost 0.67; Roman alum, 0.50; English, 0.47; and Levant alum, 0.40.

Qualities.—Dried alum has a more astringent taste than the crystallized salt. It is obtained in the form of a light, opaque, white, spongy, friable mass, 100 parts of which consist of 36.25 acid, and 63.75 alumina.

Medical properties and uses.—It is chiefly used as an escharotic to destroy fungus in ulcers; but has also been given internally to the extent of ℥j for a dose in cases of cholera, the pain of which it is said to allay, while at the same time it gently opens the bowels.

CALCIS MURIAS. Lond.² *Muriate of Lime.*

"Take of the salt which remains after the distillation of subcarbonate of ammonia, *two pounds*; water, *a pint*. Mix, and filter the solution through paper. Evaporate the liquor until the salt remains dry. Preserve it in a closely-stopped vessel."

Qualities.—Muriate of lime is inodorous, and has a disagreeable, bitter, acrid taste. It is soluble in half its weight of cold water, and to any extent in boiling water. It rapidly deliquesces in the air, and undergoes the watery fusion when heated. According to Dr. Marcet it is composed of 49 parts of acid and 57 of lime.

CALX. Lond. *Lime.*³

is the title of this section in the London Pharmacopoeia, for the same reason that we preferred the term *Neutral Salts* to that of *Alkaline Salts*.

¹ Sulfate d'Alumine Séc. (F.) Gebrannter Alaun (G.) Allume calcinato (I.)

² Muriate de Chaux (F.) Salzsaure Kalkerde (G.) Muriato di Calce (I.)

³ Chaux (F.) Kalkerde (G.) Calce (I.) Cal viva (S.)

"Take of limestone, *a pound*. Break it into small pieces, and expose it in a crucible to a very strong fire for an hour, or until the carbonic acid be so completely expelled, that on the addition of acetic acid no air bubbles are extricated.

"Lime may be made in the same manner from shells, after they have been washed in boiling water, and freed from all impurities."

Lime prepared on the great scale for the ordinary purposes of art is sufficiently pure for medicinal use; but for some pharmaceutical purposes it is required to be more completely burnt than is usually the case of that which is obtained from the kilns; and perhaps it is with this view that the above preparation has been ordered by the London College. It may, however, be observed, that neither of the substances ordered affords lime in a state of absolute purity; limestone frequently containing silex, alumina, magnesia, and marine shells; and a portion of phosphate of lime which is not decomposed by the fire. To obtain perfectly pure lime, dissolve white marble or clean oyster shells in diluted muriatic acid, and to the filtered solution add solution of ammonia as long as any precipitate falls; then filter again, and decompose the muriate by a solution of pure carbonate of potash; wash the precipitate, and expose it to violent heat in a platinum crucible, till it cease to lose weight. The result is pure lime.

Qualities. — Well prepared lime is of a white colour, moderately hard, and brittle. Its specific gravity is 2.3. Its taste is hot, pungent, and bitter; on animal matter it operates as a most powerful caustic; changes the vegetable blues to green, and is infusible. Water poured on it is absorbed with a hissing noise, much heat is evolved, and the lime swells, falls to pieces, and is then said to be slacked; in which state it readily combines with sulphur, forming a sulphuret, and is to a certain degree soluble in water. It appears to be a compound of a peculiar metal which has been named *calcium*¹, and *oxygen*.

Use. Lime in this state is chiefly employed for pharmaceutical purposes and for forming the solution.

Official preparations. *Liquor Calcis. L. E. D. Potassa cum Calce. L.*

CRETA PREPARATA. Lond.² *Prepared Chalk.*

"Take of chalk, *a pound*. Add a little water to the chalk, and triturate it to a fine powder. Throw this into a large ves-

¹ This metal has the colour and appearance of silver, is solid, four times heavier than water, absorbs oxygen, and burns brilliantly in the open air, and by being oxidized is converted into quicklime. *Phil. Trans.* 1808.

² Craie préparé (F.) Rein Kreide (G.) Carbonato di Calce preparato (I.)

sel of water, stir it, and after a short interval pour off the supernatant turbid water into another vessel, and set it apart that the powder may subside: lastly, let the water be poured off, and dry the powder."

CARBONAS CALCIS PRÆPARATUS. Edin. *Prepared Carbonate of Lime.*

"Let carbonate of lime, triturated to powder in an iron mortar, and levigated with a little water, on a porphyry stone, be put into a large vessel: then pour water upon it, which, after frequently shaking the vessel, is to be poured off loaded with the fine powder. The subtile powder which subsides, when the water remains at rest, is to be dried. Let the coarse powder which the water could not suspend be again levigated, and treated in the same manner."

CRETA PRÆPARATA. Dub. *Prepared Chalk.*

"Let it be triturated to powder in an earthen mortar, with the addition of a little water; then mix this with a sufficiently large quantity of water by agitation, and after a short interval, when the coarser particles have subsided, pour off the fluid. This may be frequently repeated, always previously triturating; and finally, collect the very fine powder, which after some time will subside, and dry it upon an absorbent stone, or paper."

By the suspension of the finer particles of the levigated chalk in water, they are reduced to a more impalpable form, and are more effectually separated from the coarser particles than could be accomplished by any other mechanical means; but the chalk is not freed from the foreign earths it generally contains, (see *Calx*, Part ii.) although it be sufficiently pure for medicinal use.

Medical properties and uses.—Chalk is antacid and absorbent. It is exhibited advantageously in acidities of the primæ viæ; and in diarrhoeas, after all irritating matters have been removed from the bowels by previous evacuation. As an external application it is sprinkled over ulcers discharging a thin ichorous matter, which is thus absorbed by the chalk, and prevented from excoriating the neighbouring sound skin. In cases of burns it is applied in a similar manner, and a poultice laid over it, by which the skimming of the sore is much hastened.¹

The dose of chalk is from grs. x. to ʒij, or more.

Official preparations. *Mistura Cretæ*. L. E. *Hydrargyrus cum Creta*. L. *Pulvis Cretæ compositus*. L. E. *Pulvis opiatus*. E. *Trochisci Carbonatis Calcis*. E.

CRETA PRÆCIPITATA. Dub. *Precipitated Chalk.*

"Take of solution of muriate of lime, any quantity. Add to it as much (*sub*) carbonate of soda, dissolved in four times

¹ *Kentish on Burns*, passim.

its weight of hot distilled water, as may be sufficient to precipitate the chalk. Wash the precipitate three times in a sufficient quantity of water; then collect it, and dry it on a chalk stone or on bibulous paper."

A double exchange takes place in this process; the muriatic acid separates from the lime and unites with the soda, while the carbonic acid of the subcarbonate combines with the lime: the muriate of soda thus formed remains dissolved in the water, but the carbonate of lime is precipitated in the form of a white powder. It is an expensive preparation, and the benefit to be derived from a great degree of purity in this substance is not very obvious.

Official preparations. *Hydrargyrum cum Creta*. D. *Electuarium aromaticum*. D. *Mistura Cretæ*. D.

MURIAS BARYTÆ. Edin.¹ *Muriate of Barytes*.

"Take of carbonate of barytes, muriatic acid, each, *one part*; water, *three parts*. To the water and the acid mixed together add the carbonate broken into small pieces. The effervescence being finished, digest for an hour; then filter, and after due evaporation set the solution apart that crystals may form. Repeat the evaporation as long as any crystals are formed.

"If the carbonate of barytes cannot be procured, the muriate may be prepared from sulphate of barytes in the following manner:

"Take of sulphate of barytes, *two pounds*; charcoal in powder, *four ounces*; muriatic acid, a *sufficient quantity*. Roast the sulphate, that it may be the more easily reduced to a very fine powder, and mix it with the powder of charcoal. Put the mixture into a crucible, and having fitted to it a cover, let it be exposed to a strong fire for six hours; then, having well triturated the matter, put it into six pounds of boiling water, in a glass or earthen vessel, and mix by agitation, preventing, as much as possible, the action of the air.

"Let the vessel stand in a vapour-bath until the undissolved part shall have subsided, and then pour off the liquor. Pour upon the residue four pounds of boiling water, which, after agitation and subsidence, add to the former liquor: and then, while it is still hot, or, if it shall have cooled, after it is again heated, let muriatic acid be dropped into it as long as any effervescence is excited. Then let the solution be filtered and evaporated, that crystals may be formed."

The simplicity of the first of these processes, in which the superior affinity of the muriatic acid for barytes effects the decomposition of the carbonate, recommends its general adoption;

¹ *Muriate de Baryte* (F.) *Salzsaure Schwererde* (G.) *Muriato di Barita* (I.)

and we believe this mineral can now be procured without difficulty, and in abundance. The second, however, may sometimes be required to be performed: it is somewhat complicated, but its theory is sufficiently obvious.

The charcoal, by the assistance of heat, decomposes the sulphuric acid of the sulphate of barytes, attracting its oxygen, and forming with it carbonic acid, which is dissipated in a gaseous form, while the sulphur remains united with the barytes. The boiling water added to this sulphuret dissolves it; but during the solution the water is partially decomposed, a portion of the sulphur attracts the oxygen of the decomposed water, and forming sulphuric acid, unites with a little of the barytes, so as to reproduce some sulphate which precipitates; while its hydrogen unites with another portion of the sulphur, and forms sulphuretted hydrogen, the combination of which, with the remaining sulphuret, converts it into a hydroguretted sulphuret, and prevents its further decomposition. Lastly, the muriatic acid added to the hot aqueous solution of these sulphurets decomposes them, disengages the sulphuretted hydrogen in the form of gas, and precipitates the sulphur; while at the same time it unites with the earth, and muriate of barytes remains in solution.

Several other methods have been proposed for the preparation of this salt, the following is that recommended by Bouillon La Grange.¹ Pulverise together equal parts of sulphate of barytes and muriate of lime; project the mixture into a red hot crucible, and let the fire be continued till the whole be melted, which is then to be poured out on a heated tile. After it is cold, reduce the mass to powder; boil it for some minutes in six times its weight of distilled water, and filter the solution: then evaporate the liquor to a pellicle, and set it aside to crystallize. The crystals require to be redissolved and again crystallized, to free them from any of the calcareous muriate they may retain on the first crystallization. The Edinburgh process, however, is still preferable to this of La Grange, as the previous calcination reduces any metallic salts that may be combined with the sulphate; and being thus rendered insoluble, they are separated during the first solution of the sulphuret.²

Qualities.—Muriate of barytes has an acrid, very nauseous, bitter taste. It crystallizes in grouped quadrangular tables,

¹ *Annales de Chimie*, xlvii. 181.

² Goetling advises muriate of soda to be added to the charcoal, by which a smaller quantity of charcoal is capable of reducing a larger quantity of sulphate of barytes. A mixture of one part of muriate of soda and two parts of muriate of lime is sufficient to decompose six of the sulphate.

bevelled on the edges; transparent, white, and very brilliant; of a specific gravity of 2.8257: and not alterable from exposure to the air. When heated, it decrepitates, becomes opaque, and ultimately melts, but is not decomposed. One part requires three of water at 60° for its solution, and 2.20 of hot water. According to Berzelius, the constituents of 100 parts of this crystallized salt are 61.85 of barytes, 23.35 of muriatic acid, and 14.80 of water.¹ It is used only for forming the following solution:

SOLUTIO MURIATIS BARYTÆ. Edin.² Solution of Muriate of Barytes.

“Take of muriate of barytes, *one part*; distilled water, *three parts*. Dissolve.”

Qualities.—This solution possesses all the chemical and medicinal properties of the muriate. It is limpid, transparent, and colourless; but is rapidly decomposed by the earthy, metallic, and alkaline sulphates and nitrates; the alkaline phosphates, borates, and carbonates, being precipitated in the form of a white powder. Its affinity for sulphuric acid is so great, that, as a re-agent, it is capable of detecting 0.00009 of that acid in any fluid.

Medical properties and uses.—This solution is stimulant and deobstruent, and in large doses poisonous. It was introduced into practice by the late Dr. Crawford as a remedy for cancerous and scrophulous affections; and its use was afterwards extended to syphilis. When taken in moderate doses, it appears to increase the secretion by the skin, augments the flow of urine, and improves the tone of the system; but by large doses, violent vomiting, purging, vertigo, and the most dangerous symptoms, are produced. When death is the consequence, it is owing, as Mr. Brodie has ascertained, to the poison acting on the brain and heart. It has undoubtedly been found beneficial in several instances of scrophula, in some cutaneous affections, and in ulcerations connected with elephantiasis; while in syphilis it has the power of suspending some of the symptoms for a short period. But although it be a medicine of some efficacy, yet, to use the words of Mr. Pearson, in whose opinion of its deficient powers as an antisiphilitic we place implicit faith, its “good qualities are uncertain in their operation, and narrowly circumscribed; nor is it a preparation on which great confidence can be placed for the cure of any ³disease.” The dose requires to be carefully apportioned, and very gradually increased, until from *m v*, which are sufficient at first,

¹ *Nicholson's Journal*, 4to. iii. 25.

² *Dissolution de Muriate de Baryte (P.) Soluzione di Muriato di Barite (I.)*

³ *Observations on Remedies for Lues Venerea*, 92.

℥ xx may be taken twice a day ; or more, if nausea be not excited. It is sometimes used externally as an escharotic to fungous ulcers and specks on the cornea.

As antidotes of muriate of barytes, when it has been taken as a poison, M. Orfila has proposed the soluble sulphates, "if administered before a quantity of the salt sufficient to exert its fatal influence on the nervous system be absorbed."

LIQUOR CALCIS. Lond.² *Lime-water.*

"Take of lime, *half a pound* ; boiling distilled water, *twelve pints*. Pour the water upon the lime, and agitate them together ; cover the vessel directly, and set it apart for three hours ; then preserve the solution upon the undissolved lime, in well stopped glass bottles, and pour off the clear fluid when it is wanted for use."

SOLUTIO CALCIS, sive AQUA CALCIS. Edin. *Solution of Lime, or Lime Water.*

"Take of lime fresh burnt, *half a pound*. Put it into an earthen vessel, and sprinkle upon it four ounces of water, keeping the vessel covered until the lime becomes hot, and falls into powder ; then pour on it twelve pounds of water, and mix the lime with water by agitation. After the lime shall have subsided, repeat the agitation ; and let this be done about ten times, the vessel being kept shut that the free access of the air may be prevented. Finally, let the water be strained through paper, interposing between it and the funnel glass rods, that the water may pass through as quickly as possible. It is to be preserved in very well stopt bottles."

Dublin.

"Take of fresh burnt lime, *a pound* ; boiling water, *a pint*. Put the lime into an earthen vessel, and sprinkle the water upon it, keeping the vessel shut until it becomes hot, and falls into powder ; then pour upon it *three gallons of water*. The vessel being again shut, let the mixture be frequently shaken for twenty-four hours ; and then filter the solution through paper placed in a covered funnel, and preserve it in well stopt bottles."

Of these formulæ, that of the London College is to be preferred ; as by keeping the solution upon the lime it is always in a completely saturated state, and the supernatant fluid is generally sufficiently clear to allow it to be decanted off without filtration. It is however adviseable, in making the solution, first to slack the lime with a small portion of water, before the whole quantity be added ; as by this it is prevented from running into a paste, which confines the action of the water. Water, when

¹ Traité des Poisons, &c. vol. i. p. 182.
(G.) Aqua di Calce (I.)

² Eau de Chaux, (F.) Kalkwasser,

cold, acts more powerfully on lime than hot water, and at 60° retains in solution rather less than 0.002 parts, or one six hundredth part of lime.

Qualities. — Lime water is inodorous; has a strong, styptic, acrid taste; is limpid and colourless; and changes to green the vegetable blue and red colours. It unites with oil, forming an imperfect soap. When exposed to the air, it attracts carbonic acid, which, combining with part of the lime held in solution, forms on its surface a pellicle of carbonate of lime, which thickens, cracks, and sinks to the bottom of the vessel, leaving its place to be supplied by another pellicle; and thus, by successive formations, the whole of the lime is abstracted from the water. Hence the necessity of preserving the solution in well closed bottles. It is decomposed by the acids and sulphur, the alkaline carbonates, phosphates, borates, tartrates, and citrates; the infusions of orange-peel, columba, cinchona, rhubarb, and senna, which are consequently incompatible in formulæ with it.

Medical properties and uses. — Lime-water is tonic, antacid, anthelmintic, and externally detergent. It proves very useful in dyspepsia attended with much acidity of the stomach, by neutralizing the acid, and dissolving the sordid mucus with which it is often loaded in this disease; and has also been found efficacious in diarrhœa, diabetes, and leucorrhœa. It destroys intestinal worms, and dissolves the mucus which forms their nidus; and for the same reason proves serviceable in slimy bowels. Its internal use, however, should be occasionally suspended for a few days, as its long continued action on the stomach is apt to prove hurtful. Externally it is applied as a lotion to foul and cancerous ulcers, tinea capitis, and scabies, but with little advantage.

The dose is from fʒij to ʒss, alone, or diluted with milk.

Official preparations. *Oleum Lini cum Calce.* E. D. *Aqua Calcis composita.* D.

LIQUOR ALUMINIS COMPOSITUS. Lond. *Compound Solution of Alum.*

“Take of alum, sulphate of zinc, each *half an ounce*; boiling water, *two pints*. Dissolve the alum and the sulphate of zinc together in the water; then filter the solution.”

Medical properties and uses. — This solution is astringent and detergent. It is employed as a lotion for cleansing ulcers, and in some cases of cutaneous eruptions. When properly diluted, it forms a useful collyrium in ophthalmia, and an injection in gleet, and in fluor albus when the discharge proceeds only from the vagina.

LIQUOR MURIATIS CALCIS. Lond.¹ *Solution of Muriate of Lime.*

"Take of muriate of lime, *two ounces*; distilled water *three fluid ounces*. Dissolve the muriate of lime in the water, and strain the solution through paper."

SOLUTIO MURIATIS CALCIS. Edin. *Solution of Muriate of Lime.*

"Take of the harder variety of carbonate of lime (namely white marble) broken into small pieces, *nine ounces*; muriatic acid, *sixteen ounces*; water, *eight ounces*. Mix the acid with the water, and gradually add the pieces of carbonate of lime. The effervescence being finished, digest for an hour. Pour off the fluid, and reduce it by evaporation to dryness. Dissolve the residue in its weight and a half of water, and filter the solution."

AQUA MURIATIS CALCIS. Dub. *Water of Muriate of Lime.*

"Take of chalk reduced to a coarse powder, *one ounce*; diluted muriatic acid, *two ounces*. Add gradually the acid to the chalk, and when the effervescence is finished, filter the solution."

In these processes the muriatic acid unites with the lime of the carbonate, and disengages the carbonic acid, which is dissipated in the gaseous form, while the muriate of lime remains dissolved in the water. The evaporation is unnecessary, if an acid of a determinate specific gravity be employed, as ordered by the Dublin College.

Qualities. — This solution is colourless, and has a disagreeable, bitter, acrid taste. It is decomposed by the sulphuric, nitric, phosphoric, fluoric, and boracic acids; the neutral salts into which these enter; and the alkalies and alkaline carbonates, which precipitate the lime. In the solid state, 100 parts of dry muriate of lime, after being exposed to a red heat, consist of 49 of acid, 51 of lime.² By mixing four parts of it with an equal quantity of snow, a degree of cold is produced capable of sinking the mercury in the thermometer from 32° to 40° below 0° of Fahrenheit.

Medical properties and uses. — Muriate of lime is deobstruent and tonic. It was introduced into practice by Fourcroy, and has been much recommended as a remedy in scrophulous and glandular diseases. I have given it with evident advantage in bronchocele; and have witnessed more benefit result from its continued use in the varied forms of scrophula, than from any other remedy. Its operation is similar to that of muriate

¹ Dissolution de Muriate de Chaux (F.) Liquore di Muriato di Calce (I.)

² Marcet.

of barytes; but the danger of an over dose is less to be dreaded, and its good effects are more uniform and certain. The dose of the solution is from $\mathfrak{mxx}$ to $\mathfrak{fj}$, increased gradually to $\mathfrak{fjiv}$, in a sufficient quantity of water or milk, repeated twice or thrice a day.

MAGNESIA. Lond.¹ *Magnesia.*

"Take of (*sub*) carbonate of magnesia, *four ounces*. Burn it in a very strong fire for two hours, or until no effervescence is excited when acetic acid is dropped on it."

Edinburgh.

"Let (*sub*) carbonate of magnesia be exposed in a crucible to a red heat for two hours; after which preserve it in close stopped bottles."

MAGNESIA USTA. Dub. *Calcined Magnesia.*

"Take of magnesia *any quantity*. Let it be put into a crucible, and subjected to a strong heat for two hours; and when it has cooled preserve it in a well closed glass vessel."

The carbonic acid is expelled by the heat, and the pure earth remains in the proportion of five-twelfths of the weight of the subcarbonate employed; or $\mathfrak{fj}$ leaves 200 grs. of magnesia.²

Qualities.—It is inodorous and insipid; in the form of a white, very light, soft powder, having a specific gravity of 2.3. It turns to green the more delicate vegetable blues; does not effervesce with acids; is infusible; and requires for its solution 2000 parts of water at 60°. When exposed to the air it attracts slowly carbonic acid. Sir H. Davy has ascertained that, like the other alkaline earths, it is a compound of a peculiar metal, which he has named *magnesium*, and oxygen.

Medical properties and uses.—The same as those of the subcarbonate. It sometimes contains lime, which is discovered by a precipitate falling when oxalate of ammonia is added to its solution in sulphuric acid. Its dose is from grs. x. to $\mathfrak{fss}$. taken in water or milk.

MAGNE'SIÆ CARBO'NAS.³ Lond. *Carbonate of Magnesia.*

"Take of sulphate of magnesia, *a pound*; subcarbonate of potash, *nine ounces*; water *three gallons*. Dissolve separately the subcarbonate of potash in three pints of water, and the sulphate of magnesia in five pints, and filter: then add the rest

¹ *Magnesie (F.) Gebrannto Magnesia (G.) Magnesia (I.)*

² *Black on Magnesia Alba, 28.*

³ *Carbonate de Magnésie (F.) Kohlensaure Magnesia (G.) Carbonato di Magnesia (I.)* This preparation should be denominated *Subcarbonas Magnesiæ*. Carbonate of magnesia is obtained by using a larger proportion of the subcarbonate, and allowing the filtered solution to remain at rest for three days. It crystallizes in small transparent hexagonal prisms, terminated by a hexagonal plane. See *Butin sur la Magnésie*.

of the water to the solution of sulphate of magnesia, and boil it, adding to it while it is boiling the solution of the subcarbonate, with constant stirring; and strain through linen. Lastly, wash the powder repeatedly with boiling water, and dry it upon bibulous paper with a heat of 200° ."

CARBONAS MAGNESIÆ. Edin. *Carbonate of Magnesia.*

"Take of sulphate of magnesia, *four parts*; subcarbonate of potash *three parts*; boiling water a *sufficient quantity*. Dissolve the salts separately in twice their weight of water, and strain, or otherwise free from impurities; then mix them, and instantly add eight times their weight of boiling water. Boil the liquor for a short time stirring it; then let it remain at rest until the heat be a little diminished, and strain it through linen, upon which the carbonate of magnesia will remain. The carbonate after being well washed with pure water, is to be dried with a gentle heat."

MAGNESIA. Dub. *Magnesia.*

"Take of sulphate of magnesia, subcarbonate of potash, each *two pounds*; boiling water, *twenty pints*. Dissolve the sulphate of magnesia and the kali, each in ten pounds of water. Mix together the defecated liquors; then boil the mixture for a short time, and strain it while it is hot through linen stretched in a proper manner for collecting the magnesia. Wash away the sulphate of kali by repeated affusions of boiling water; and finally, dry the magnesia."

The product of these processes is an insoluble subcarbonate of magnesia. Both the salts are decomposed, and a double exchange takes place; the sulphuric acid separates from the magnesia, and unites with the potash of the subcarbonate, disengaging the carbonic acid, which in its turn combines with the magnesia. The success of the operation depends very much on the degree of attention which is paid to the following circumstances: The water employed in every part of the process must be very soft, either rain water or pure distilled water; the subcarbonate of potash should be previously freed as completely as possible from any admixture of silica, by passing through the alkaline solution a current of carbonic acid, or exposing it to the air for some time before it be used, and the mixing the salts in small portions of water; and after boiling the mixture, throwing it into a large quantity of water. The large proportion of water ordered, and the boiling, are necessary for dissolving the sulphate of potash, and for expelling any redundant carbonic acid which might occasion the magnesia to crystallize, and render it gritty. Mr. Henry recommends to pour off the water by inclination, and to put the precipitate upon chalk-stones for a little time; after which it is to

be wrapped up in sheets of white paper, and dried before the fire.¹

The greater part, however, of the subcarbonate of magnesia found in the shops is prepared, on a great scale, from bittern, the liquor remaining after the crystallization of common salt from sea water. The bittern is heated to 212° , a solution of impure subcarbonate of potash instantly added to it, and the fire withdrawn. The other steps of the process resemble those above detailed.

Qualities. — Subcarbonate of magnesia is inodorous and insipid; perfectly white, very light, smooth to the touch, nearly insoluble in water, and effervesces with acids. Its specific gravity is 0.294.² It is decomposed by all the acids, the alkalies, the neutral salts, lime, barytes, alumina, and by a strong heat. According to Dalton, the constituents of 100 parts are 40 of acid, 43 of magnesia, and 17 of water.

Medical properties and uses. — Subcarbonate of magnesia is antacid. It is a useful remedy in acidity of the primæ viæ, particularly of children, in aphthous fever, and that which attends dentition. The compound formed by its union with an acid in the stomach is purgative; but if no acid be present, magnesia does not appear to increase in any degree the peristaltic motion of the bowels. It is preferable to chalk and other absorbents in heartburn, when the bowels are costive; and has been given with advantage in dysentery, combined with ipecacuanha and opium, and the dose followed by a draught of lemonade. In calculus, when the concretions are formed in the kidney, no remedy is so efficacious. The extrication of the carbonic acid in the gaseous state, when the subcarbonate is decomposed by acid in the stomach, sometimes proves inconvenient from the distension it occasions; but more generally it is beneficial. The usual dose is from ʒss to ʒij, taken in water or milk.

Official preparations. *Magnesia. L. E. D. Hydrargyrus cum Magnesia. D.*

¹ Henry's Experiments on the Preparation, &c. of Magnesia, 8vo. Lond. 1773.

² Hoffmanni Op. iv. 473.

TABLE presenting a synoptical view of the Neutral Salts with alkaline and earthy bases, employed as remedies, or for pharmaceutical purposes.*

Salts.	Taste.	Figure of Crystals.	Action of Air.	Solubility in 100 parts of Water.		Action of Heat.
				at 60°	at 212°	
Sulphate of barytes	None	Rhomboidal prisms	None	0	0.002	Decrepitates.
— potash	Bitter	Six-sided prisms	None	6.25	24	Decrepitates.
— soda	Bitter	Six-sided prisms	Effloresces	35	125	Watery fusion.
— magnesia	Bitter	Four-sided prisms	None	100	133	Watery fusion.
Alum	Astringent	Octohedrons	Little	20	133	Watery fusion.
Nitrate of potash	Cooling	Six-sided prisms	None	14.3	100	Fuses.
Muriate of barytes	Astringent	Six-sided prisms	None	20	30	Decrepitates.
— soda	Salt	Cubes	None	35.46	36.16	Decrepitates.
— lime	Bitter	Six-sided prisms	Deliquesces	400		Watery fusion.
— ammonia	Acrid	Four-sided pyramids	Subdeliquesces	31	50	Sublimes.
— magnesia	Bitter	Needles	Deliquesces	151		Watery fusion.
Hyperoxymuriate of potash	Cooling	Rhomboidal plates	None	6	40	Gives out oxygen
Phosphate of lime	None	Six-sided prisms	None	0	0	Fuses
— soda	Salt	Rhomboidal prisms	Effloresces	25	50	Watery fusion.
Borax	Styptic	Six-sided prisms	Effloresces		16.8	Watery fusion.
Carbonate of barytes	None	Various	None	0.023	0.043	Little.
— lime	None	Rhomboidal prisms	None	0	0	Decrepitates.
— potash	Alkaline	Four-sided prisms	None	25	83½	Watery fusion.
— soda	Alkaline	Octohedral truncated	Effloresces	50	100+	Watery fusion.
— magnesia	None	Six-sided prisms	Effloresces	2		Decrepitates.
— ammonia	Urinous	Irregular	None	50+	100	Evaporates.
Acetate of potash	Hot	Plates	Deliquesces	99		Melts.
— ammonia	Cool	Slender prisms	Deliquesces	Very soluble.		Melts & sublimes.
Tartar	Acid	Irregular prisms	None	1½	3½	Melts.
Tartrate of potash	Bitter	Four-sided prisms	None	25	50	Melts.
Tartrate of potash and soda	Bitter	Eight-sided prisms	Effloresces	20	30	Melts.

* We have formed this Table from the more general table of Dr. Thomson, correcting some of the proportions by experiment. See *System of Chemistry*, 4th ed. iii. 268.