

## CHAP. IV.—EARTHS, AND EARTHY SALTS.

MURIAS BARYTÆ. *Ed.**Muriate of Baryta.*

Take of

Carbonate of baryta,  
Muriatic acid, of each one part;  
Water, three parts.

Add the carbonate, broken into little bits, to the water and acid, previously mixed. After the effervescence has ceased, digest for an hour, strain the liquor, and set it aside to crystallize. Repeat the evaporation as long as any crystals are formed.

If the carbonate of baryta cannot be procured, the muriate may be prepared in the following manner from the sulphate.

Take of

Sulphate of baryta, two pounds;  
Charcoal of wood, in powder, four ounces.

Roast the sulphate, that it may be more easily reduced to a very fine powder, with which the powdered charcoal is to be intimately mixed. Put the mixture into a crucible, and having fitted it with a cover, heat it with a strong fire for six hours. Then triturate the matter well, and throw it into six pounds of water in an earthen or glass vessel, and mix them by agitation, preventing as much as possible the action of the air.

Let the vessel stand in a vapour bath until the part not dissolved shall subside, then pour off the liquor. On the undissolved part pour four pounds more of boiling water, which, after agitation and deposition, are to be added to the former liquor. Into the liquor, when still warm, or if it shall have cooled, again heated, drop muriatic acid as long as it excites any effervescence. Then strain it, and evaporate it so as to crystallize.

In the materia medica of the Edinburgh college, the carbonate of baryta is introduced, for the purpose of forming the muriate; but as that mineral is not very common, and sometimes not to be procured, it became necessary to describe the manner of preparing the muriate from the sulphate. This is, however, attended with very considerable difficulties, on ac-

count of the very strong attraction which subsists between the sulphuric acid and baryta.

The sulphate of baryta may be decomposed,  
1. By compound affinity, by means of carbonate of potass or muriate of lime.

Carbonate of potass is capable of effecting this decomposition, either in the dry or humid way. Klaproth boils sixteen ounces of finely powdered sulphate of baryta with 32 ounces of purified carbonate of potass, and five pounds of water, for an hour in a tin kettle, constantly agitating the mixture, and renewing the water as it evaporates. He then allows it to settle, pours off the fluid, which is a solution of sulphate of potass, and edulcorates the precipitate with plenty of water. He next dissolves the carbonate of baryta, which it contains, in muriatic acid. The portion of sulphate which is not decomposed, may be treated again in the same manner.

On the other hand, Van Mons mixes equal parts of sulphate of baryta and carbonate of potass with one-fourth of their weight of charcoal, all in powder, and heats the mixture to redness in a crucible. When it cools, he washes out the sulphate and sulphuret of potass, with water, then boils the residuum with a little potass, and washes it again. The carbonate of baryta thus obtained he dissolves in muriatic acid.

But by these methods of decomposing the sulphate of baryta, we do not get rid of the metallic substances which it often contains, and which render the muriate thus prepared unfit for medical use. The metalline muriates may, however, be expelled, according to Westrumb, by heating the salt to redness as long as any fumes arise. The pure muriate of baryta is then to be dissolved in water, and crystallized. Götting, with the same intention, of getting rid of metalline substances, chooses sulphate of baryta, perfectly colourless, and treats it with muriatic or nitro-muriatic acid before he proceeds to decompose it.

La Grange has proposed a new method of decomposing the sulphate of baryta, by means of muriate of lime, which he prepares from the residuum of the decomposition of muriate of ammonia by lime, by dissolving it in a small quantity of hot water, and evaporating it to dryness. He mixes equal parts of this muriate with sulphate of baryta in powder, and projects it by spoonfuls into a crucible previously heated to redness. When it is all in complete fusion, he pours it out upon a polished stone previously heated. The matter, which cracks as it cools, has a whitish-grey colour, and is very hard,

sonorous, and deliquescent, is now to be boiled in about six times its weight of distilled water, its solution filtered, and the residuum boiled in a smaller quantity of water. The mixed solutions are then evaporated to a pellicle, and on cooling furnish beautiful crystals of muriate of baryta, which are to be washed with cold water, and purified by a second solution and crystallization. The mother water of the first crystallization still contains muriate of baryta, which may be separated from the muriate of lime, with which it is mixed, by repeated solutions and crystallizations. La Grange thinks that this process not only saves time, fuel, and muriatic acid, but that it furnishes a purer muriate of baryta than the following process.

2. By decomposing its acid, by means of charcoal.

The acid of the sulphate of baryta is decomposed at a very high temperature by charcoal. At such a temperature charcoal has a greater affinity for oxygen than sulphur has; it therefore decomposes the sulphuric acid, by depriving it of its oxygen, and flies off in the state of carbonic oxide or acid gas, while the sulphur combines with the baryta. On adding water to the sulphuret thus formed, new combinations take place. A portion of sulphate of baryta is regenerated, while hydroguretted sulphuret, and sulphuretted hydroguret of baryta, remain in solution. This solution is exceedingly prone to decomposition, and must, therefore, be preserved from the action of the air as much as possible. It also crystallizes by cooling, and therefore should be kept at a boiling heat. On the addition of muriatic acid, there is a violent effervescence and disengagement of sulphuretted hydrogen gas, which must be avoided as much as possible, by performing the operation under a chimney, while very pure muriate of baryta remains in solution. When prepared in this way, it cannot be contaminated with any of the noxious metals, as their compounds with sulphur and hydrogen are not soluble. On this account, therefore, it is the process adopted by the Edinburgh college.

Muriate of baryta commonly crystallizes in tables. It has a disagreeable bitter taste; is soluble in three parts of water at 60°, and in less boiling water. It is scarcely soluble in alcohol; and its solution burns with a yellow flame. It crystallizes by evaporation; its crystals are permanent; and by the action of heat decrepitate, dry, and melt. For making a solution, the crystals should be used entire; for when previously powdered, it always turns out turbid. When crystallized,

it contains about 20 acid, 64 baryta, and 16 water; when dried, 23.8 acid, and 76.2 baryta. It is decomposed by the sulphates, nitrates, succinates, oxalates, tartrates, and sulphites; and by the alkaline phosphates, borates, and carbonates, and their acids. It is also decomposed by succinate of ammonia, nitrate of silver, acetate, nitrate and phosphate of mercury, acetate of lead, tartrates of iron and antimony, burnt sponge, and Hermbstadt's antimonial tincture, antimonial wine, soap, &c., extracts of gentian, marsh trefoil, and the inspissated juices of aconite, hemlock and hyoseyamus.

It is not decomposed by muriate of iron, or corrosive sublimate, and bears the addition of aromatic distilled waters, simple syrups, gum arabic mucilage, some simple extracts, pure opium, and similar substances, when they do not contain astringent matter. When pure it has no colour; does not deliquesce; does not burn with a red or purple flame, when dissolved in alcohol; and is not precipitated by gallic acid, prussiate of potass and iron, or hydro-sulphuret of ammonia. By washing with alcohol muriate of baryta, rendered impure by the presence of muriate of iron, the latter alone is dissolved.

It is commonly given in solution.

SOLUTIO MURIATIS BARYTÆ. *Ed.*

*Solution of Muriate of Baryta.*

Take of

Muriate of baryta, one part;

Distilled water, three parts. Dissolve.

THE proportion of water directed here for the solution of muriate of baryta is considerably less than what is stated to be necessary by the writers on chemistry. It is, however, sufficient, even at the lowest ordinary temperatures; a circumstance which should be attended to in making saturated solutions of saline bodies.

*Medical use.*—Muriate of baryta is generally said, by writers on the materia medica, to be a *stimulant* deobstruent; and yet Hufeland, one of its greatest supporters, says, that it succeeds better in cases attended with inflammation and increased irritability than with atony and torpor. When given in large doses, it certainly produces nausea, vomiting, diarrhoea, vertigo, and death.

Its effects on a morbid state of the body are also disputed. Some assert that it is of advantage in no disease; while others

bestow upon it the most unqualified praises. By the latter, it is principally celebrated,

1. In all cases of scrofula ;
2. In obstructions and tumours ;
3. In cases of worms ;
4. In cutaneous diseases.

The dose of the solution, at first, is five or ten drops twice or thrice a-day, to be gradually and cautiously increased to as much as the patient can bear.

The solution is also used externally as a stimulating and gently escharotic application in cutaneous diseases, fungous ulcers and specks upon the cornea.

CALX.  *Lond.*

*Lime.*

Take of

Limestone, one pound.

Break it into bits, and burn it for an hour in a crucible with a violent heat, or until the carbonic acid be totally expelled, so that on dropping on it acetic acid, no air bubbles are formed.

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

LIME is not found in nature, but it is easily procured by the action of fire from any of the abundant carbonates, mineral or animal. For most purposes common lime will do ; but as it is seldom totally deprived of its carbonic acid, it may be necessary for the apothecary to prepare it himself. Clean oyster-shells afford it in the greatest purity ; and as pure lime is not altered by any heat that can be applied, there is no risk of pushing the fire too far. Marble, and many lime-stones, also furnish a very pure lime ; but those which contain a mixture of other earths, are apt to become vitrified on the surface, which prevents them from slaking.

AQUA CALCIS.  *Ed.*

*Lime Water.*

Take of

Fresh burnt lime, half a pound.

Put it into an earthen vessel, and gradually sprinkle on it four ounces of water, keeping the vessel covered, while the lime grows hot, and falls into powder. Then pour on it twelve pounds of water, and mix the lime thoroughly with

the water by agitation. After the lime has subsided, repeat the agitation, and let this be done about ten times, always keeping the vessel covered, that the free access of the air may be prevented. Lastly, let the water be filtered through paper, placed in a funnel, with glass rods interposed between them, that the water may pass as quickly as possible. It must be kept in very close bottles.

*Dub.*

Take of

Lime recently burnt, one pound;

Boiling water, one pint.

Put the lime into an earthen vessel, and sprinkle the water upon it, keeping the vessel shut while the lime grows warm and falls into powder: then pour upon it three gallons of cold water, and close the vessel, agitating it frequently for twenty-four hours; lastly, filter the water through paper, placed in a covered funnel, and keep it in well-closed bottles.

LIQUOR CALCIS. *Lond.**Solution of Lime.*

Take of

Lime, half a pound;

Boiling distilled water, twelve pints.

Pour the water on the lime, and stir them together; immediately cover the vessel, and set it aside for three hours; then preserve the liquor upon the remaining lime in well-corked bottles, and decant off the limpid solution when wanted for use.

WE have already had occasion to speak of the properties of lime, and shall therefore now confine our remarks to the solution of it in water, commonly called Lime-water. In making this, we should first add only so much water as is sufficient to slake the lime, which reduces it to a fine powder, easily diffused through water; for if we add more water at first, it forms a paste with the external part of the lime, and defends the internal from the action of the water. During the whole process, the air must be excluded as much as possible, as lime has a very strong affinity for carbonic acid, and attracts it from the atmosphere. The proportion of water used is scarcely able to dissolve one-tenth of the lime; but lime is of little value; and our object is to form a saturated solution quickly and easily. Lime is actually more soluble in cold wa-

ter than in hot : therefore it is unnecessary to use boiling water. The Edinburgh and Dublin colleges filter their solutions ; and if we use the precautions directed, it may be performed without the lime absorbing a perceptible quantity of carbonic acid. The bottles in which lime-water is kept should be perfectly full, and well corked.

The London college do not filter, but decant off their solution, and if carefully performed it will be perfectly pure ; and the directions given by them, in their last edition, of keeping their lime-water upon an excess of lime, is certainly an advantage, as we are sure of its being always saturated, for fresh lime will be always dissolved to supply the place of that rendered insoluble, and precipitated by the absorption of carbonic acid.

Lime-water is transparent and colourless. It has an austere acid taste, and affects vegetable colours as the alkalies do. Good lime-water is precipitated white by alkaline carbonates, and orange by corrosive sublimate. It enters very readily into combination with all the acids, sulphur, and phosphorus, and decomposes the alkaline carbonates, phosphates, fluates, borates, oxalates, tartrates, and citrates, the ammoniacal acetates, muriates and succinates, the sulphates of alumina and magnesia, the metallic salts, spiritous liquors, and astringent substances.

*Medical use.*—When applied to the living fibre, lime-water corrugates and shortens it ; it therefore possesses astringent powers. It is also a powerful antacid, or at least it combines with, and neutralizes acids when it comes in contact with them. It also dissolves mucus, and kills intestinal worms. From possessing these properties, it is used in medicine, in diseases supposed to arise from laxity and debility of the solids, as diarrhœa, diabetes, leucorrhœa, scrofula, and scurvy ; in affections of the stomach accompanied with acidity and flatulence ; when the intestines are loaded with mucus ; and in worms. Lime-water is scarcely capable of dissolving, even out of the body, any of the substances of which urinary calculi consist ; it has therefore no pretensions to the character of a lithontriptic. It has been also recommended in crusta lactea, in cancer, and in chronic cutaneous diseases. Externally, it is applied to ill-conditioned ulcers, gangrenous sores ; as a wash in tinea capitis and psora ; and as an injection in gonorrhœa, fistulas, and ulcers of the bladder.

When taken internally, its taste is said to be best covered by lukewarm milk. Its dose is commonly from two to four

ounces, frequently repeated; but when long continued, it weakens the organs of digestion.

CARBONAS CALCIS PRÆPARATUS; olim, CRETA PRÆPARATA, et CANCRORUM LAPILLI. *Ed.*

*Prepared Carbonate of Lime; formerly Prepared Chalk, and Crabs Stones.*

CARBONATE of lime, whether the softer variety commonly called Chalk, or the harder variety called Crabs Eyes and Crabs Stones, after having been triturated to powder in an iron mortar, and levigated on a porphyry stone with a little water, is to be put into a large vessel, and water to be poured upon it, which, after agitating the vessel repeatedly, is to be decanted off, while loaded with minute powder. On allowing the water to settle, a subtile powder will subside, which is to be dried.

The coarse powder which the water could not suspend, may be levigated again, and treated in the same manner.

CRETA PRÆPARATA. *Lond.*

*Prepared Chalk.*

Take of  
Chalk, one pound.

Add a little water to the chalk, and triturate it to fine powder. Throw this into a large vessel filled with water, then agitate them, and after a short pause, decant off the supernatant liquid, still turbid, into another vessel, and set it aside, that the powder may subside. Lastly, having poured off the water, dry this powder.

TESTÆ PRÆPARATÆ. *Lond.*

*Prepared Oyster Shells.*

Wash the shells, previously well cleaned, in boiling water, then prepare them in the same manner as chalk is prepared.

CRETA PRÆPARATA. *Dub.*

*Prepared Chalk.*

Grind it to powder in an earthen-ware mortar, with the addition of a little water; then mix it with a sufficient quantity of water by agitation; and after allowing it to stand a little, until the coarser particles fall to the bottom, pour off the liquor. This may be frequently repeated, triturating previously each time. Finally, the very fine powder, which,



after some time, will subside in the decanted liquor, is to be collected and dried upon a bibulous stone or paper.

OSTREARUM TESTÆ PRÆPARATÆ, *Prepared Oyster Shells,*  
 OVORUM TESTÆ PRÆPARATÆ, *Prepared Egg Shells,*  
 Are to be prepared in the same manner as chalk.

THE preparation of these substances merely consists in reducing them to an impalpable powder.

*Medical use.*—Carbonate of lime is commonly called an absorbent earth. It certainly is an antacid; that is, it combines with and neutralizes most acids, while its carbonic acid is expelled in the form of gas. It is therefore exhibited in affections of the stomach accompanied with acidity, especially when at the same time there is a tendency to diarrhœa. The fear of its forming concretions in the bowels, is probably imaginary; for it is not warranted either by theory or experience.

Applied externally, carbonate of lime may be considered as an absorbent in another point of view; for its beneficial action on burns and ulcers probably arises entirely from its imbibing the moisture or ichorous matter, as a sponge would do, and thus preventing it from acting on the abraded surfaces, and excoriating the neighbouring parts.

CRETA PRÆCIPITATA. *Dub.*  
*Precipitated Chalk.*

Take of

Water of muriate of lime, any quantity.

Add as much carbonate of soda, dissolved in four times its weight of distilled warm water, as is sufficient to precipitate the chalk. Wash the matter which falls to the bottom, three times, by pouring on, each time, a sufficient quantity of water. Lastly, having collected it, dry it upon a chalk stone or paper.

THIS preparation affords carbonate of lime in its purest state, and, although expensive, may be employed when it is intended for internal use.

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

Take of

The salt which remains after the distillation of the subcarbonate of ammonia, two pounds;

Water, one pint.

Dissolve and filter through paper. Evaporate the liquor until the salt be rendered dry. Keep this in a well-closed phial.

**LIQUOR CALCIS MURIATIS.** *Lond.*

*Liquor of Muriate of Lime.*

Take of

Muriate of lime, two ounces;  
Distilled water, three fluidounces.

Dissolve the muriate of lime in the water, then filter through paper.

**SOLUTIO MURIATIS CALCIS.** *Ed.*

*Solution of Muriate of Lime.*

Take of

Hard carbonate of lime, that is white marble, broken into 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. When the effervescence has ceased, digest them for an hour, pour off the liquor and evaporate it to dryness. Dissolve the residuum in its weight and a half of water, and, lastly, filter the solution.

**AQUA MURIATIS CALCIS.** *Dub.*

*Water of Muriate of Lime.*

Take of

Chalk, in coarse powder, one ounce;

Diluted muriatic acid, two ounces.

Gradually add the chalk to the acid, and, after the effervescence is finished, filter.

From the difficulty of crystallizing this salt, it is directed by the Edinburgh college to be evaporated to the total expulsion of its water of crystallization, as being the surest way of obtaining a solution of uniform strength. With the same view, the Dublin College saturate muriatic acid of a given strength; and Dr Wood directs, that the solution should always have a determinate specific gravity. It may be economically prepared from the residuum in the decomposition of muriate of ammonia, by lime or chalk, according to the directions of the Berlin Pharmacopœia, now adopted by the London college, by watery fusion, solution, filtration, and crystallization. Its purity is ascertained by its remaining colourless and transparent, with infusion of galls and caustic ammonia; a brown colour indicating the presence of iron, and a precipitation that of alumina. But it may be purified by boil-

ing it in solution an hour, with a sufficient quantity of pure chalk, or other carbonate of lime, filtrating it, evaporating it gently, till it acquire the specific gravity of 1.5, allowing it to stand some days in a corked bottle, decanting it carefully from the sediment, and duly evaporating it.

The crystals of this salt are prisms of six smooth and equal sides, but they are often so aggregated, that they can only be termed acicular. Its taste is pungent, bitter, and disagreeable. When heated, it melts, swells, and loses its water of crystallization. It is one of the most deliquescent salts known, and is so soluble, that water seems capable of dissolving twice its weight, or, at least, forms with it a viscid liquor; but as it is still capable of attracting moisture from the air, and of emitting caloric, when farther diluted, it can scarcely be considered as a true solution.\* Dörfurt says, it is perfectly soluble in one and a half cold water, and in much less than its own weight of boiling water. It is also soluble in an equal weight of boiling alcohol, and its solution burns with a crimson flame. It is decomposed by the sulphuric, nitric, oxalic, tartaric, succinic, phosphoric, fluoric, and boracic acids; by baryta, potass, soda, and strontia; by carbonated, sulphated, phosphated, tartarated, acetated alkalies; superoxalate of potass, sub-borate of soda, boro-tartrate of potass and soda, tartrate of potass and soda, succinate of ammonia, alum, sulphate of magnesia, nitrate of silver, nitrate, phosphate, and acetate of mercury, acetate of lead, and sulphate of iron, copper and zinc. Crystallized, it contains, according to Bergman, 31 acid, 44 lime, and 25 water; dried at a red heat, 42 acid, 50 lime, and 8 water.

*Medical use.*—It was first proposed as a medicine by Fourcroy, and has been lately extolled in scrofulous and glandular diseases, and cases of debility in general, by several eminent practitioners of our own country, Dr Beddoes, Dr R. Pearson, and Dr Wood. Thirty drops of the solution are a sufficient dose for children, and a drachm for adults, repeated twice or thrice a-day. In an over-dose, it has produced qualms and sickness; and three drachms and a half killed a dog, the stomach of which, upon dissection, had its villous coat bloodshot, and in many parts almost black, and converted into a gelatinous slime. Perhaps it is the muriate of lime which is the active ingredient in the lotions prepared by triturating calomel or corrosive sublimate in lime-water. The compound resulting is a solution of muriate of lime, with oxide of mercury diffused through it. The property of this salt, of producing intense cold during its solution, might also be

applied to medical use; and its strong affinity for water and alcohol fits it for the rectification of alcohol and ether.

CORNU USTUM. *Lond.*

*Burnt Horn.*

Burn pieces of horn in the open fire, until they become perfectly white; then reduce them to powder, and prepare it in the same manner as is directed for chalk.

PULVIS CORNU CERVINI USTI. *Dub.*

*Powder of Burnt Hartshorn.*

Burn pieces of hartshorn till they become perfectly white; then reduce them to a very fine powder.

THE pieces of horn generally employed in this operation are those left after distillation.

In the burning of hartshorn, a sufficient fire, and the free admission of air are necessary. The potter's furnace was formerly directed, for the sake of convenience; but any common furnace or stove will do. Indeed, too violent a heat makes their surface undergo a kind of fusion and vitrification, which both prevents the internal parts from being completely burnt, and renders the whole less soluble. If the pieces of horn be laid on some lighted charcoal, spread on the bottom of the grate, they will be burnt to whiteness, still retaining their original form.

According to the analysis of Merat Guillot, hartshorn consists of 27. gelatine, 57.5 phosphate of lime, 1. carbonate of lime, and there was a loss of 14.5, probably water. Now, as the gelatine is destroyed by burning, and the water expelled, the substance which remains is phosphate of lime, mixed with less than two *per cent.* of carbonate of lime. Fourcroy and Vauquelin have analysed bones more accurately, and found that they contain phosphate of magnesia, iron, and manganese, and that human bones contain less of the first of these, and more of the two others than animal bones, which is probably owing to the constant excretion of phosphate of magnesia in human urine. In human bones there are also traces of alumine and silex.

*Medical use.*—From its white earthy appearance, it was formerly considered as an absorbent earth. But since it has been accurately analysed, that idea has been laid aside, and its use has been suggested as a remedy in rickets, a disease in which the deficiency of the natural deposition of phosphate of lime in the bones seems to be the essential, or, at least, the most striking symptom. Mr Bonhomme, therefore, gave it to

the extent of half a scruple, mixed with phosphate of soda, in several cases with apparent success. Whatever objections may be made to this theory, the practice certainly deserves a trial.

MAGNESIA. *Ed.*

*Magnesia.*

Let carbonate of magnesia, put into a crucible, be kept in a red heat for two hours; then put it up in close-stopt glass vessels.

*Lond.*

Take of

Carbonate of magnesia, four ounces.

Burn it with a very fierce fire for two hours, or until acetic acid dropped upon it cause no effervescence.

MAGNESIA USTA. *Dub.*

*Calcined Magnesia.*

Take of

Magnesia, any quantity.

Expose it to a strong heat in a crucible, for two hours; and, when cold, put it into a glass vessel.

By this process the carbonate of magnesia is freed of its acid and water; and, according to the late Dr Black's experiments, loses about  $\frac{7}{11}$  of its weight. A kind of opaque, foggy vapour is observed to escape during the calcination, which is nothing else than a quantity of fine particles of magnesia, buoyed off along with a stream of the disengaged gas. About the end of the operation, the magnesia exhibits a kind of luminous or phosphorescent property, which may be considered as a pretty exact criterion of its being deprived of its acid.

It is to be kept in close vessels, because it attracts, though slowly, the carbonic acid of the atmosphere. Its sp. gr. is 2.33, and when sprinkled with water, heat is produced, and it absorbs 18 *per cent.* Magnesia decomposes alum, borax, tartrate and succinate of ammonia, tartrate of potass, tartrate of potass and soda, and all the officinal metallic salts.

*Medical use.*—It is used for the same general purposes as the carbonate. In certain affections of the stomach, accompanied with much flatulence, magnesia is preferable, both because it contains more magnesia in a given bulk, and, being deprived of its acid, it neutralizes the acid of the stomach, without any extrication of gas, which is often a troublesome

consequence when carbonate of magnesia is employed in these complaints.

**CARBONAS MAGNESIÆ.** *Ed.*  
*Carbonate of Magnesia.*

Take of  
Sulphate of magnesia ;  
Carbonate of potass, equal weights.

Dissolve them separately in twice their weight of warm water, and let the liquors be strained, or otherwise freed from their feces ; then mix them, and instantly add eight times their weight of boiling water. Let the liquor boil for a little on the fire, stirring it at the same time ; then let it rest till the heat be somewhat diminished ; after which strain it through linen : the carbonate of magnesia will remain upon the cloth, and is to be washed with pure water till it become altogether void of saline taste.

*Lond.*

Take of  
Sulphate of magnesia, one pound ;  
Subcarbonate of potass, nine ounces ;  
Water, three gallons.

Dissolve separately the subcarbonate in three pints of the water, and the sulphate in five, and filter. Then add the rest of the water to the solution of the sulphate ; boil it, and, while it is boiling, mix with it, under constant stirring, the solution of the subcarbonate, and filter through linen. Lastly, wash the powder with repeated affusions of boiling water, and dry upon blotting paper, with a heat of 200°.

**MAGNESIA.** *Dub.*  
*Magnesia.*

Take of  
Sulphate of magnesia,  
Subcarbonate of kali, of each two pounds ;  
Boiling water, twenty pints.

Dissolve the sulphate of magnesia and the kali, each in ten pounds of water. Mix the defæcated liquors. Boil the mixture a little, and, while still warm, filter it through linen, stretched, so as to fit it for collecting the magnesia. Wash off the sulphate of kali, by repeated affusions of boiling water ; and, lastly, dry the magnesia.

In this process, there is a mutual decomposition of the two salts employed. The potass unites itself to the sulphuric

acid, while the carbonic acid combines with the magnesia, to form subcarbonate of magnesia. The large quantity of water used is necessary for the solution of the sulphate of potass formed; and the boiling is indispensably requisite for the expulsion of a portion of the carbonic acid, which is furnished in excess by the alkali, and would otherwise retain a part of the magnesia in solution: 100 parts of crystallized carbonate of potass are sufficient for the decomposition of 125 parts of sulphate of magnesia; and, from these quantities, about 45 parts of carbonate of magnesia are obtained. Mr Phillips says, that 3 of the alkaline salt are sufficient to decompose 4 of the sulphate of magnesia: his proportions have been adopted by the London college.

The ablutions should be made with very pure water; for nicer purposes distilled water may be used; and soft water is, in every case, necessary. Hard water, for this process, is peculiarly inadmissible, as the principle in waters, giving the property called *hardness*, is generally a salt of lime, which decomposes the carbonate of magnesia, by compound affinity, giving rise to carbonate of lime, while the magnesia unites itself to the acid of the calcareous salt, by which the quantity of the carbonate is not only lessened, but is rendered impure by the admixture of carbonate of lime. Another source of impurity is the silica, which the subcarbonate of potass generally contains. It is most easily got rid of by exposing the alkaline solution to the air for several days before it is used. In proportion as it becomes saturated with carbonic acid, the silica is precipitated, and may be separated by filtration.

In the preparation of the subcarbonate of magnesia, the Berlin college order subcarbonate of soda to be used, which has the advantage of forming with the sulphuric acid of the sulphate of magnesia a much more soluble salt than the sulphate of potass, and the magnesian precipitate is said to turn out lighter and whiter, the less water there is employed in its preparation. The carbonate of magnesia of commerce is prepared from the muriate of magnesia, which remains in solution after the crystallization of muriate of soda from sea-water.

The carbonate of magnesia, thus prepared, is a very light, white, opaque substance, without smell or taste, effervescing with acids. It is not, however, saturated with carbonic acid. By decomposing sulphate of magnesia by an alkaline carbonate, without the application of heat, carbonate of magnesia is gradually deposited in transparent, brilliant, hexagonal crystals, terminated by an oblique hexagonal plane, and soluble in about 480 times their weight of water. The crystallized

carbonate of magnesia consists of 50 acid, 25 magnesia, and 25 water; the subcarbonate requires at least 850 times its weight of water for its solution, and consists of 48 acid, 40 magnesia, and 12 water; and that of commerce, of 34 acid, 45 magnesia, and 21 water. It is decomposed by all the acids, potass, soda, baryta, lime, and strontia, the sulphate, phosphate, nitrate, and muriate of alumina, and the superphosphate of lime.

*Medical use.*—Carbonate of magnesia is principally given to correct acidity of the stomach, and, in these cases, to act as a purgative; for solutions of magnesia in all acids are bitter and purgative, while those of the other earths are more or less austere and astringent. A large dose of magnesia, if the stomach contain no acid to dissolve it, neither purges nor produces any sensible effect; a moderate one, if an acid be lodged there, or if acid liquors be taken after it, procures several stools; whereas the common absorbents, in the same circumstances, instead of loosening, bind the belly. When the carbonate of magnesia meets with an acid in the stomach, there is extricated a considerable quantity of carbonic acid gas, which sometimes causes uneasy distention of the stomach, and the symptoms of flatulence. In such cases, therefore, magnesia is preferable to its carbonate; but, on other occasions, as in nausea and vomiting, good effects arise from the action of the gas evolved.

SULPHAS ALUMINÆ EXSICCATUS, olim ALUMEN USTUM. *Ed.*

*Dried Sulphate of Alumina, formerly Burnt Alum.*

Melt alum in an earthen or iron vessel, and keep it over the fire until it cease to boil.

ALUMEN EXSICCATUM. *Lond.*

*Dried Alum.*

Melt alum in an earthen pot over the fire, which is to be increased until the ebullition cease.

ALUMEN USTUM. *Dub.*

*Burnt Alum.*

Take of

Alum, any quantity.

Expose it in an earthen vessel to a strong fire, until it cease to boil.

THE vessel in which this process is conducted, must contain at least three times as much as the alum operated on, as



this swells exceedingly in drying, and would otherwise run over.

Mr Chaptal found, that by exsiccation in a red heat, alum of his own manufacture lost 0.67, Roman alum 0.50, English alum 0.47, and Levant alum only 0.40. These differences arise principally from different proportions of water of crystallization, but also from an excess of alumina, which the last contains.

According to Kirwan, crystallized alum consists of 17.66 acid, 12 alumina, and 70.24 water, and alum desiccated at 700°, of 36.25 acid, and 63.75 basis, by which it would appear, that at that heat it loses not only all its water, but also more than half its acid.

Dried alum is only applied externally, as a gentle escharotic to fungous ulcers.

## CHAP. V.—METALLINE PREPARATIONS.

### ANTIMONY.

#### SULPHURETUM ANTIMONII PRÆPARATUM. *Ed.*

*Prepared Sulphuret of Antimony.*

Sulphuret of antimony is prepared in the same way as carbonate of lime.

*Dub.*

Reduce it to powder, and separate for use the impalpable particles, in the manner directed for the preparation of chalk.

By reducing the sulphuret of antimony to the state of an impalpable powder, it is both rendered much more active, and is prevented from irritating the stomach mechanically, of which there would be some danger, from the sharpness of its spiculæ. Even in this state, however, it is not a very certain remedy. In general, it operates as a mild sudorific or cathartic; but sometimes, if it meet with much acid in the stomach, it becomes more active, producing vomiting and hypercatharsis. Therefore, it seems prudent to evacuate the primæ viæ before it be exhibited, and to combine it with an absorbent earth.