acid liquor, and the acid they contain is easily obtained by evaporation and crystallization. The acid may afterwards be purified by solution in boiling water and crystallization, according to the directions of the colleges.

But even after repeated solutions and crystallizations, a portion of empyreumatic oil still adheres to the acid, and renders it impure. Other methods of purifying it have been therefore attempted. Demachy saturated it with lime, separated the lime by sulphuric acid, and sublimed the succinic acid: Richter saturated succinic acid with potass, decomposed the salt formed with acetate of lead, and disengaged the succinic acid from the lead by means of diluted sulphuric acid: lastly, Morveau asserts that he obtained it in a state of perfect purity, by treating it with nitrous acid. It is often adulterated with muriate of ammonia, sulphuric acid, sulphate of potass, sugar, &c. When pure it is entirely volatile, gives out no ammoniacal fumes when triturated with potass, is not precipitated by solutions of baryta, and is soluble in alcohol.

Succinic acid, although retained in the Edinburgh and Dublin Pharmacopœias, is never used in medicine. It has been rejected from the London.

Chap. III.—ALKALIES, and ALKALINE SALTS.

Aqua potassæ: vulgo Lixivium causticum. *Ed.*
Solution of Potass, commonly called *Caustic Ley.*

Take of
Newly prepared lime, eight ounces;
Carbonate of potass, six ounces.

Put the lime into an iron or earthen vessel, with twenty-eight ounces of warm water. After the ebullition is finished, instantly add the salt; and having thoroughly mixed them, cover the vessel till they cool. When the mixture has cooled, agitate it well, and pour it into a glass funnel, the throat of which is obstructed with a piece of clean linen. Cover the upper orifice of the funnel, and insert its tube into another glass vessel, so that the Solution of Potass may gradually drop through the rag into the lower vessel. As soon as it ceases to drop, pour into the funnel some ounces of water, but cautiously, so that it may swim above the matter in the funnel. The Solution of Potass will again

begin to drop, and the affusion of water is to be repeated in the same manner, until three pounds have dropped, which will happen in the space of two or three days; then mix the superior and inferior parts of the liquor together by agitation, and keep it in a well-stopt phial.

Liquor potassæ. *Lond.*
Solution of Potass.

Take of
Sub-carbonate of potass, one pound;
Fresh lime, half a pound;
Distilled water, boiling, a gallon.

Dissolve the potass in two pints of the water; add the rest of the water to the lime. Mix the liquors while hot, set the mixture aside in a covered vessel; and after it has cooled, filter it through cotton cloth.

If any diluted acid, dropt into it, excite effervescence, more lime must be added, and the filtration repeated.

A pint of this liquor should weigh sixteen ounces.

Aqua kali caustici. *Dub.*
Solution of Caustic Kali.

Take of
Fresh burnt lime, eight ounces;
Subcarbonate of kali, six ounces.

Put the lime into an earthen vessel, and sprinkle upon it two pints of boiling water. With the slaked lime mix the salt, and cover the vessel. Pour the mass, as soon as it has cooled, into a glass funnel, whose throat is obstructed with a rag. Having covered the funnel, let the ley drop into a vessel placed below it, and pour water from time to time into the funnel, until three pints have passed through.

Let the liquor be agitated, and kept in a bottle of green glass well closed.

If the ley be rightly prepared, it will have neither colour nor smell, and will scarcely effervesce when mixed with acids. If it effervesce considerably, add a little fresh burnt lime, in very fine powder; digest for twenty-four hours in a close vessel, with occasional agitation; then filter the ley in the manner already directed.

The specific gravity of this liquor is to that of distilled water as 1100 to 1000.

These processes do not differ materially. They are founded upon the affinity of lime being stronger than that of potass

for carbonic acid. Of course, when lime comes in contact with carbonate of potass, the carbonic acid quits the potass to unite with the lime, and the results of the mixture are potass and carbonate of lime. Now, as the carbonate of lime is insoluble in water, and the potass is very soluble, they may be separated by filtration. In doing this, however, we must take care to employ instruments on which the solution of potass does not act, and to prevent the free access of air, from which it would attract carbonic acid, and thus frustrate the whole operation. The latter object is attained by covering the upper or broad end of the funnel with a plate of glass, and inserting the lower end into the neck of a phial, which it fits pretty closely. The former object is attended with greater difficulties, and indeed scarcely to be effected, so powerful and general is the agency of potass. All animal substances are immediately attacked and destroyed by it; therefore, our filters cannot be made of silk, woollen, or paper which contains glue; and although neither vegetable matters nor silica entirely escape its action, linen and sand are, on the whole, the least objectionable. A filter of sand was used by Dr Black: he first dropt a rugged pebble into the tube of the funnel, in some part of which it formed itself a firm bed, while the inequalities on its surface afforded interstices of sufficient size for the passage of the filtering liquor. On the upper surface of this stone he put a thin layer of lint or clean tow; immediately above this, but not in contact with it, he dropped a stone similar to the former, and of a size proportioned to the swell in the upper part of the tube of the funnel. The interstices between this second stone and the funnel were filled up with stones of a less dimension, and the gradation uniformly continued till pretty small sand was employed. Finally, this was covered with a layer of coarser sand, and small stones, to sustain the weight of the fluid. A filter of sand being thus constructed in the funnel, it was washed perfectly clean, by making clean water pass through it, till it dropt from the lower extremity of the funnel perfectly clear and transparent; and before using it, it was allowed to stand for some days, that no water might remain among the interstices of the sand.

From the spongy nature of the residuum which remains upon the filter, and especially if we use that of sand, a considerable quantity of the solution of potass will be retained. It is, however, easily obtained, by pouring gently over it, so as to disturb it as little as possible, a quantity of water; the ley immediately begins again to drop from the funnel, and as,

from the difference of their specific gravity, the water does not mix with it, but swims above it, the whole ley passes through before any of the water. By means of the taste we easily learn when the whole ley has passed.

As it is natural to suppose that the strongest solution will pass first, and the weakest last, we are directed to agitate the whole together, to render their strength uniform.

If the solution of potass be pure, it will be colourless, and it will neither effervesce with acids, nor form a precipitate with carbonate of potass. If it effervesces, carbonic acid is present, and must be separated by again boiling the solution with a little lime, or by dropping it into lime-water, as long as it produces any precipitate. But Mr Phillips has remarked, that even when a small quantity of carbonic acid is contained in it, no precipitate is produced unless a considerable quantity of lime-water be added. If, on the contrary, it contain lime, from too much of it having been employed in the preparation, it may be separated by dropping into the ley a solution of the carbonate of potass. When we have thus purified our solution of potass, it must be again filtered. Mr Phillips objected to this process as in the London Pharmacopœia of 1809, that the quantity of lime employed was much too large, and that a half of the weight of the subcarbonate is sufficient, as in fact 33 parts of lime will saturate the 26 of carbonic acid commonly contained in 100 parts of subcarbonate of potass; and his suggestion has been adopted in the edition 1815. But this objection is obviated by the mode of filtration used by the Edinburgh college; and although from calculation the quantity of lime seems excessive, it is necessary to render the potass perfectly caustic.

Medical use.—The solution of caustic potass, under various names, has at different times been celebrated as a lithontriptic, and as often fallen again into disuse. The very contradictory accounts of its effects as a solvent are now, in some degree, explicable, since it has been discovered that urinary calculi are very different in their natures, so that some of them are only soluble in acids, and others only in alkalies. Of the last description are the calculi of uric acid, which are very frequent, and those of urate of ammonia. On these, therefore, alkalies may be supposed to make some impression; and that alkalies, or alkaline carbonates, taken by the mouth, have occasionally relieved calculous complaints, is certain. It is however said, that their continued use debilitates the stomach; and M. Fourcroy has proposed applying the remedy immediately to the disease, by injecting into the blad-

der a tepid solution of potass or soda, so dilute that it can be held in the mouth. Before the alkaline solution be injected, the bladder is to be completely evacuated of urine, and washed out with an injection of tepid water. After the alkaline injection has remained in the bladder half an hour or more, it is to be evacuated, and allowed to settle. If, on the addition of a little muriatic acid, a precipitate be formed, we shall have reason to conclude that the calculus contains uric acid, and that the alkali has acted on it.

Very dilute alkaline solutions may also be taken into the stomach as antacids, but we possess others which are preferable.

Mr Brandish, who has strongly recommended the solution of caustic potash for the cure of scrofula, gives the following complicated formula for its preparation.

Take of

American pearl ashes, six pounds.
Fresh burnt lime,
Fresh ashes of ash wood, each two pounds.
Boiling water, six gallons.

He reverses the common method of slaking lime, by desiring it to be gradually added to the water kept boiling: He then adds the pearl ashes, then the wood ashes; stirs all together, and lastly draws off the clear liquor slowly. He used to prepare it without the pearl ashes, but found they rendered it softer, which no doubt they would, as the quantity of lime is insufficient to abstract all the carbonic acid, and would leave the liquor in a state of subcarbonate. He says that a wine pint of his solution should weigh 18 or 19 ounces. He recommends the addition of a drop or two of genuine oil of juniper to the pint of liquor, and orders it to be taken twice a-day in the following doses; to a child from four to six, 1 drachm by measure; from six to eight, one drachm and a half; eight to fifteen, 2 drachms; fifteen to eighteen, two and a half; to adults 3 and sometimes 4. It should, however, be begun in rather smaller doses. The vehicle may be fresh beer, malt-tea, barley-water, or water-gruel.

Externally, alkaline solutions have been more frequently used, either very dilute, simply as a stimulus, in rickets, gouty swellings, gonorrhœa, and spasmodic diseases, or concentrated as a caustic, to destroy the poison of the viper, and of rabid animals.

POTASSA; olim CAUSTICUM COMMUNE ACERRIMUM. *Ed.*
Potass; formerly Strongest Common Caustic.

Take of
The solution of potass, any quantity.
Evaporate it in a covered very clean iron vessel, till, on the ebullition ceasing, the saline matter flow gently like oil, which happens before the vessel becomes red. Then pour it out on a smooth iron plate; let it be divided into small pieces before it hardens, and immediately deposited in a well-stopt phial.

POTASSA FUSA. *Lond.*
Melted Potass.

Take of
Liquor of potass, one gallon.
Evaporate the liquor in a bright iron vessel over the fire, until after the cessation of the boiling the potass melt. Pour this out upon an iron plate into proper moulds.

KALI CAUSTICUM. *Dub.*
Caustic Kali.

Take of
Solution of caustic kali, any quantity.
Evaporate it over the fire in a very clean iron vessel, until, the ebullition having ceased, the saline matter, on increasing the heat, remain almost at rest in the vessel. Let the liquefied salt be poured out upon an iron plate, and while it is congealing, be cut into proper pieces, which are immediately to be put into a well-closed phial.
During the evaporation, let the operator avoid the drops spirted up.

THE principal thing to be attended to in this operation, is to conduct the evaporation so rapidly that the ley shall not absorb any carbonic acid from the atmosphere. As long as any water of solution remains, the ebullition is evident, and the evaporation is to be continued until it cease. The heat is then to be increased a little, which renders the potass perfectly fluid, and gives it the appearance of an oil, when it is ready to be poured out, either on a slab, as directed by the colleges, or into iron moulds, such as are used for the melted nitrate of silver.

The potass prepared according to these directions is sufficiently pure for medical use, but is not fit for chemical experiments. We can, however, obtain it perfectly white and

crystallized, according to Berthollet, by adding to the ley, when evaporated so far that it would assume the consistence of honey, if permitted to cool, a quantity of alcohol equal to one-third of the carbonate of potass operated on, mixing them together, and letting them boil a minute or two. The mixture is then to be poured into a glass vessel, and corked up, when the impurities will gradually subside, partly in a solid form, and partly dissolved in water. The supernatant alcoholic solution is then to be evaporated rapidly, till its surface become covered with a black crust, which is to be removed, and the liquid below is to be poured into a porcelain vessel, when it will concrete into a white substance, which is to be broken in pieces, and immediately excluded from the action of the air.

A less expensive way of obtaining potass perfectly pure is that of Lowitz. Evaporate a solution of potass till a thick pellicle form on its surface; allow it to cool, separate all the crystals formed, as they consist of foreign salts: renew the evaporation, in an iron or silver bason; and remove the pellicles which form on the surface with an iron skimmer, as long as any appear. When the ebullition ceases, remove the vessel from the fire, and agitate the fused salt with an iron spatula while it cools. Dissolve the saline mass in twice its weight of water, and evaporate in a silver bason till it begins to crystallize. The crystals are pure potass. The fluid which swims over them has a dark brown colour, and must be poured off: but if kept in a close-stopt phial, it will deposite its colouring matter, and by evaporation will furnish more crystals of potass.

Medical use.—Potass is only used as a caustic, or to form solutions of a known strength; and even its use as a caustic is inconvenient, from its being so quickly affected by the air, and from its rapid deliquescence, which renders it apt to spread.

Potassa cum calce. *Ed.*
Potass with Lime.

Take of

Solution of Potass, any quantity.

Evaporate it in a covered iron vessel till one-third remains; then mix it with as much new slaked lime as will bring it to the consistence of pretty solid pap, which is to be kept in a vessel closely stopt.

Lond.

Take of
Liquor of potass, three pints;
Fresh lime, one pound.
Boil down the liquor to one pint, then add the lime previously slaked, and mix them intimately.

KALI CAUSTICUM CUM CALCE. *Dub.*
Caustic Kali with Lime.

Evaporate solution of caustic kali to one-third, then add as much fresh burnt lime, in powder, as will form a sufficiently thick mass, which is to be kept in a well-closed vessel.

THE addition of the lime in these preparations renders them less apt to deliquesce, more easily managed, and milder in their operation than fused potass.

CARBONAS POTASSÆ. *Ed.*
Carbonate of Potass.

Let impure carbonate of potass (called in English *pearl ashes*) be put into a crucible, and brought to a low red heat, that the oily impurities, if there be any, may be burnt out: then triturate it with an equal weight of water, and mix them thoroughly by agitation. After the feces have subsided, pour the liquor into a very clean iron pot, and boil to dryness, stirring the salt towards the end of the process, to prevent its sticking to the vessel.

POTASSÆ SUBCARBONAS. *Lond.*
Subcarbonate of Potass.

Take of
Impure potashes, in powder, three pounds;
Boiling water, three pints and a half.
Dissolve the potashes in the water, and filter, then pour it into a bright iron vessel, and evaporate the water by a gentle heat until the liquor become thick; then, having removed it from the fire, stir it constantly with an iron spatula until it become a granulated salt.

A purer subcarbonate of potass may be prepared in the same manner from Tartar, previously burnt till it becomes of an ash colour.

SUBCARBONAS KALI. *Dub.*
Subcarbonate of Kali.

Take of
Potashes, in coarse powder,
Cold water, each six pounds.

Mix them by trituration, and macerate them for a week in a wide vessel, with occasional agitation. Filter the ley, and evaporate it to dryness in a very clean iron vessel. Towards the end of the evaporation, stir the saline mass constantly with an iron spatula. When thus reduced to coarse powder, keep it in close vessels.

Before the ashes are dissolved in the water, if they be not sufficiently pure, roast them in a crucible till they become white.

CARBONAS POTASSÆ PURISSIMUS; olim, SAL TARTARI. *Ed.*
Pure Carbonate of Potash; formerly *Salt of Tartar.*

Take of
Impure super-tartrate of potass, any quantity.

Wrap it up in moist bibulous paper, or put it into a crucible, and burn it into a black mass, by placing it among live coals. Having reduced this mass to powder, expose it in an open crucible to the action of a moderate fire, till it become white, or at least of an ash-grey colour, taking care that it do not melt. Then dissolve it in warm water; strain the liquor through a linen cloth, and evaporate it in a clean iron vessel, diligently stirring it, towards the end of the process, with an iron spatula, to prevent it from sticking to the bottom of the vessel. A very white salt will remain, which is to be left a little longer on the fire, till the bottom of the vessel becomes almost red. Lastly, when the salt is grown cold, keep it in glass vessels, well stopped.

KALI E TARTARO. *Dub.*
Kali from Tartar.

Take of
Crystals of tartar, any quantity.

Heat them to redness in a silver crucible, loosely covered, until they cease to emit fumes. Reduce the mass which remains to coarse powder, and roast it for two hours in the same crucible, uncovered, stirring it frequently. Boil this in twice its weight of water, for a quarter of an hour, and after the liquor has become pure, pour it off. Repeat this three times.

Filter the mixed leys, and evaporate them in a silver bason. While the salt which remains is drying, granulate it by frequent agitation, and then heat it to a dull red. Take it out of the vessel before it is quite cold, and keep it in well-stopt phials.

The potash of commerce we have already shewn to contain a considerable proportion of foreign salts. By the process directed by the colleges, it is purified from those which are crystallizable; and, although it still contains muriate of potass and silica, it is sufficiently pure for the purposes of medicine. Mr Phillips says, when prepared from pearl ash, it consists of about 26 carbonic acid, 71 potash and water, two muriate of potash, and one sulphate of potash, and a little silica.

The purest subcarbonate of potass, in common use, is that obtained by incinerating the impure supertartrate of potass, as all the substances it contains, except the potass, are decomposed by the heat. The tartaric acid and colouring matter are destroyed, and part of the carbonic acid, which is formed, unites with the potass.

But this salt, in whatever way obtained, is not strictly entitled to the appellation of carbonate, given it by the Edinburgh college; for it is not saturated with the acid, or rather it is a mixture of potass and carbonate of potass, in variable proportions. It is owing to the uncombined potass that it is still deliquescent, and in some degree caustic.

Medical use.—Subcarbonate of potass is frequently employed in medicine, in conjunction with other articles, particularly for the formation of saline neutral draughts and mixtures; but it is used also by itself, in doses from three or four grains to fifteen or twenty; and it frequently operates as a powerful diuretic, particularly when aided by proper dilution.

Potassæ carbonas. *Lond.*
Carbonate of Potass.

Take of
Subcarbonate of potass from tartar, one pound;
Subcarbonate of ammonia, three ounces;
Distilled water, one pint.

Add the subcarbonate of ammonia to the potass dissolved in the water. Then expose it for three hours to the heat of 180° in a sand bath, or until the ammonia be expelled.—Lastly, set it aside to crystallize. The residuary liquor may

be evaporated in the same manner, so as again to afford crystals on being set aside.

Subcarbonate of potass is easily saturated with carbonic acid, by exposing it, in solution, to the contact of the air for a considerable time, or more quickly by making a stream of carbonic acid gas evolved from carbonate of lime by sulphuric acid, pass through a solution of it, or by distilling it with carbonate of ammonia, as proposed by Berthollet, and directed by the London college. The last is more expensive than the second, but it does not require any particular apparatus. M. Curadow has invented a cheaper mode of saturating potass with carbonic acid. He dissolves the potass in a sufficient quantity of boiling water, mixes it with as much dried tanners' bark as to make it pretty dry, and then exposes the mixture, in a covered crucible, to the heat of a reverberatory furnace for half an hour. By lixiviation and crystallization, the mixture affords beautiful permanent crystals of carbonate of potass. In this state it consists of about 43 acid, 40 potass, and 17 water. The saturation with carbonic acid is one of the best means of purifying the subcarbonate of potass; for it always separates silica from the uncombined alkali; and hence, perhaps, the employment of the subcarbonate from tartar is unnecessarily expensive.

Liquor potassæ subcarbonatis. *Lond.*
Solution of Subcarbonate of Potass.

Take of
Subcarbonate of potass, one pound;
Distilled water, twelve fluidounces.
Dissolve the subcarbonate of potass in the water, and filter through paper.

Aqua subcarbonatis kali. *Dub.*
Solution of Subcarbonate of Kali.

Take of
Subcarbonate of kali, any quantity.
Place it in a wide glass funnel, whose throat is obstructed with a rag. Set this in a cellar, that the salt may deliquesce in the moist air. Let the solution be caught in a vessel placed under it.

The preparation of the Dublin college is the old *Oleum tartari per deliquium*, and is a solution of carbonate of potass in a variable quantity of water; for, by exposure to the air,

the subcarbonate attracts not only water, but carbonic acid. It is therefore improperly named. The name of the London college is correct, and the preparation nearly uniform in point of strength. Dr Powell says, that the quantities ordered by the college will commonly give a solution amounting to nearly 18 ounces in bulk.

AQUA SUPERCARBONATIS POTASSÆ. *Ed.*
Solution of Supercarbonate of Potass.

Take of
Water, ten pounds.
Pure carbonate of potass, one ounce;
Dissolve, and expose the solution to a stream of carbonic acid, arising from
Carbonate of lime in powder,
Sulphuric acid, each three ounces;
Water, three pounds, gradually and cautiously mixed.
The chemical apparatus invented by Dr Nooth is well adapted for this preparation. But, if a larger quantity of the liquor be required, the apparatus of Dr Woulfe is preferable.
The colder the air, and the greater the pressure, the better will the solution be, which must be kept in well-corked vessels.

As soon as the preparation is finished, the liquor should be drawn off into pint bottles, which are to be well-corked, and kept in a cool situation, with the head down, or laid on one side. It should be perfectly transparent, and have an acidulous, not at all alkaline, taste; and, when poured out of the bottles, it should have a sparkling appearance.

Medical use.—In this solution, carbonate of potass is combined with excess of carbonic acid, by which means it is better adapted for internal use, as it is rendered not only more pleasant to the taste, but is less apt to offend the stomach. Indeed, it is the only form in which we can exhibit potass in sufficient doses, and for a sufficient length of time, to derive much benefit from its use in calculous complaints. It has certainly been frequently of advantage in these affections, but probably only in those instances in which the stone consists of uric acid, or urate of ammonia; for, although supersaturated with carbonic acid, yet the affinity of that acid for potass is so weak, that it really operates as an alkali.

Six or eight ounces may be taken two or three times a-day. It in general proves powerfully diuretic, and sometimes pro-

duces inebriation. This last effect is ascribed to the carbonic acid.

ACETIS POTASSÆ. *Ed.*
Acetite of Potass.

Take of
Pure carbonate of potass, one pound.
Boil it with a very gentle heat, in four or five times its weight of distilled acetous acid, and add more acid at different times, till on the watery part of the preceding quantity being nearly dissipated by evaporation, the new addition of acid ceases to raise any effervescence, which will happen when about twenty pounds of acid have been consumed. It is then to be slowly dried. The impure salt remaining is to be melted with a gentle heat, for a short time, but no longer than necessary, and afterwards dissolved in water, and filtered through paper. If the liquefaction has been properly performed, the filtered liquor will be limpid; but if otherwise, of a brown colour. Afterwards evaporate this liquor with a very gentle heat, in a very shallow glass vessel, occasionally stirring the salt as it becomes dry, that its moisture may be sooner dissipated. Lastly, the acetite of potass ought to be kept in a vessel very closely stopped, to prevent it from deliquescing.

POTASSÆ ACETAS. *Lond.*
Acetate of Potass.

Take of
Subcarbonate of potass, a pound and a half;
Acetic acid, a gallon.
Mix them together in a large glass vessel, and having evaporated the mixture over the fire to one-half, add gradually as much more acetic acid as may be sufficient to saturate the alkali completely. Evaporate again to one half, and filter. Then evaporate in the water bath, so that, on being removed from the fire, it shall crystallize.

ACETAS KALI. *Dub.*
Acetate of Kali.

Take of
Subcarbonate of kali, any quantity.
Add to it, at different times, about five times its weight of distilled vinegar, heated to a moderate temperature. When the effervescence shall have ceased, and the liquor is somewhat evaporated, add, at intervals, distilled vinegar, until

the mixture shall entirely cease to effervesce; then evaporate to dryness; and having increased the fire a little, bring the saline mass cautiously into a state of fusion. Dissolve the salt, after it has cooled, in water: filter the solution, and evaporate, until, on removing it from the fire, it shall concrete into a crystalline mass, which should be very white. Put this, as quickly as possible, into vessels accurately closed.

This is both a troublesome and expensive preparation; for, when attempted to be made by simply evaporating to dryness, the salt has always a dark unpleasant colour, which can neither be removed by repeated solution and crystallization, nor even by solution in alcohol. It is doubtful to what the colour is owing. It has been ascribed by some to part of the acetic acid being decomposed by heat during the exsiccation of the salt: they accordingly recommend the evaporation to be conducted very gently, and the pellicles to be skimmed from the surface of the liquor as fast as they are formed; and in this way, they say, they have procured, at once, a very white salt. Others again ascribe it to accidental impurities, contracted during the operation, and recommend the utmost attention to cleanliness, and the use of earthen vessels; while others ascribe it to some foreign matter, which rises in distillation with the last portions of the acetous acid, and therefore direct, that only the first portions which come over should be used, or that the acetous acid should be distilled with charcoal. The last opinion appears to be the most probable, since, when acetic acid procured from the distillation of an acetate is employed, a colourless solution is obtained, and solutions which become coloured do not at the same time become alkaline. But to whatever cause it be owing, the colour is most effectually destroyed by fusing the salt. The heat necessary to do this decomposes the colouring matter; and on dissolving the fused mass in water, and filtering the solution, we find a fine light charcoal on the filter. But this fusion is attended with considerable loss; for part of the acetic acid itself is decomposed.

To ascertain the exact saturation, litmus and turmeric paper should be alternately employed. Mr Phillips says, that rather more than 21 pints o fdistilled vinegar, of 1.007, are required to saturate 18 ounces of subcarbonate of potass.

The operator must be particularly careful, in melting it, not to use a greater heat, nor keep it longer liquefied, than

what is absolutely necessary: a little should be occasionally taken out, and put into water; and, as soon as it begins to part freely with its black colour, the whole is to be removed from the fire.

The exsiccation of the solution of the salt, after it has been fused, must be conducted very carefully, as it is exceedingly apt to be decomposed, which would render a new solution and exsiccation necessary. The test of its purity, by dissolving it in alcohol, as directed by the London college, is to discover if any of the acetic acid itself has been decomposed in the operation; for the carbonate of potass, which is in that case formed, is insoluble in alcohol.

To spare trouble and expence, attempts have been made to prepare acetate of potass with undistilled vinegar, and even with the residuum of the distillation of acetic acid: and they have been, to a certain degree, successful: but, as repeated fusion and crystallization are necessary to bring the salt to a certain degree of purity, it does not appear that they were more economical. But if, to acetate of potass, prepared with impure vinegar, we add a sufficient quantity of sulphuric acid, we obtain by distillation an acetic acid of great strength, which forms a beautiful acetate of potass without fusion. Lastly, this salt may be prepared by the decomposition of acetates; for example, of the acetate of lime, by tartrate of potass.

Acetate of potass has a sharp, somewhat pungent taste. It is deliquescent, and is soluble in about its own weight of water, at 60°, but Mr Phillips says in half its weight, at 40°. It is also, according to Dr Powell, soluble in alcohol in four times its weight. It is decomposed by the stronger acids; by a decoction of tamarinds; by the sulphates of soda and of magnesia; by muriate of ammonia; by the tartrate of soda and potass; and by some metalline salts. Its acid is destroyed by a high temperature.

Medical use.—Acetate of potass, however prepared, provided it be properly made, is a medicine of great efficacy, and may be so dosed and managed as to prove either mildly cathartic, or powerfully diuretic: few of the saline deobstruents equal it in virtue. The dose is from half a scruple to a drachm or two. A simple solution, however, of carbonate of potass in vinegar, without exsiccation, is perhaps not inferior, as a medicine, to the more expensive salt. Two drachms of the alkali, saturated with vinegar, have produced, in hydropic cases, ten or twelve stools, and a plentiful discharge of urine, without any inconvenience.

SULPHAS POTASSÆ *Ed.*

Sulphate of Potass; formerly *Vitriolated Tartar.*

Take of

Sulphuric acid, diluted with six times its weight of water, any quantity.

Put it into a capacious glass vessel, and gradually drop into it, as much pure carbonate of potass, dissolved in six times its weight of water, as is sufficient thoroughly to neutralize the acid. The effervescence being finished, strain the liquor through paper; and, after due evaporation, set it aside to crystallize.

Sulphate of potass may be also conveniently prepared from the residuum of the distillation of nitrous acid, by dissolving it in warm water, and saturating it with carbonate of potass.

POTASSÆ SULPHAS. *Lond.*

Take of

The salt, which remains after the distillation of nitric acid, two pounds;

Boiling water, two gallons.

Mix them so as to dissolve the salt, and then add as much subcarbonate of potass as will saturate the excessive acid. Then boil to a pellicle, and, after filtration, set it aside to crystallize. Decant off the liquor, aud dry the crystals on blotting paper.

SULPHAS KALI. *Dub.*

Sulphate of Kali.

Let the salt which remains after the distillation of nitrous acid reduced to powder, be dissolved in a sufficient quantity of boiling water. Add as much potash as will saturate the superfluous acid. Let the filtered liquor be evaporated with a very gentle heat, that it may crystallize.

THIS salt is very seldom prepared on purpose, as it may be obtained from the residuum of many other preparations, by simple solution and crystallization; for so strong is the affinity between sulphuric acid and potass, that they scarcely ever meet without combining to form this salt. All the sulphates, except that of baryta, are decomposed by potass and most of its combinations; and reciprocally, all the compounds of potass are decomposed by sulphuric acid and most of its combinations; and in all these decompositions, sulphate of potass is one of the products.

The greatest part of the sulphate of potass of commerce is obtained from the residuum of the distillation of sulphate of

iron with nitrate of potass, by lixiviating it, supersaturating the solution with carbonate of potass, filtering it boiling hot, and allowing it to crystallize. The liquor remaining after the precipitation of magnesia is also a solution of sulphate of potass. It is likewise got in considerable quantities from the residuum remaining in the retort, after the distillation of nitrous acid, and all the colleges have given directions for obtaining it, in this way, by simply saturating the excess of acid with subcarbonate of potass. Mr Phillips says it would be more economical to saturate any unavoidable excess of acid by lime, and reject the sulphate of lime formed, as the sulphate of potass is not so costly as the carbonate of potass used to make it.

As the residuum of the distillation of nitrous acid may not always be at hand, the Edinburgh college also give a receipt for making this salt, by directly combining its constituents. It would have been more economical to have used a solution of sulphate of iron, in place of sulphuric acid, by which means not only an equally pure sulphate of potass would have been procured, at less expence, but also a very pure carbonate of iron.

Sulphate of potass forms small, transparent, very hard crystals, generally aggregated in crusts, and permanent in the air. Their primitive form is a pyramidal dodecahedron with isosceles triangular faces meeting at the summit, at an angle of about 66.15, and at the base 113.45. It has a bitter taste, is slowly soluble in water, requiring 16 waters at 60°, and 4 at 212°. It is not soluble in alcohol. It decrepitates when thrown on live coals, and melts in a red heat.

It consists of 32.8 acid, and 67.2 potash and water, according to Mr Phillips. It is decomposed by the barytic salts; by the nitrates and muriates of lime and of strontia; by the tartrates partially; and by the salts of mercury, silver, and lead.

Medical use.—Sulphate of potass, in small doses, as a scruple, or half a drachm, is an useful aperient; in larger ones, as four or five drachms, a mild cathartic, which does not pass off so hastily as the sulphate of soda, and seems to extend its action farther.

Potassæ supersulphas. *Lond.*
Supersulphate of Potass.

Take of

The salt which remains after the distillation of nitric acid, two pounds,

Boiling water, four pints.

Mix, dissolve the salt, and filter. Then boil down to one-half, and set it aside to crystallize. Pour off the liquid, and dry the crystals on blotting paper.

This salt is acid to the taste, reddens vegetable blues, and effervesces with alkaline carbonates. Mr Phillips found, that 100 grains required 25 of dried subcarbonate of soda for saturation. It is directed by Lowitz to be prepared by mixing seven parts of sulphuric acid with the same quantity of water in a large matrass, and adding to the hot mixture, as quickly as possible, four parts of potashes in fine powder. On cooling, the supersulphate of potass shoots in fine large crystals, whose primitive form is an acute rhomboid of 74° and 106°. These are to be quickly washed in water and dried. This mode of directly preparing it is, however, unnecessary, as it is produced in sufficient quantity in the distillation of nitric acid. Its preparation, however, is attended with some difficulty, and Mr Phillips at first thought that there was no supersulphate, as he only obtained from the residuum of the distillation of nitrous acid, sulphate with acid adhering to it. From subsequent experiments, he is of opinion, that it may be made to yield supersulphate or sulphate, according as the solution is more or less concentrated. When the residual salt is dissolved in only about an equal weight of water, Mr Phillips found it deposite on cooling, supersulphate of potass, without any appearance of pellicle; but if the solution be evaporated to a pellicle, according to the former directions of the college, the whole concretes into a solid mass; and when the solution is not perfectly concentrated, the crystals obtained are sulphate of potass. It is also with extreme surprise that we learned from Mr Phillips, that on sending to Apothecaries Hall, where at least the directions of the college ought to be minutely adhered to, what he received was a mixture of 58 sulphate of potass, with 42 nitrate of potass. With such an excessive quantity of acid as the college order in preparing nitrous acid, it is perfectly impossible that so much, if any, nitre could have escaped decomposition. This salt was formerly called *Sal enixum* and *Tartarus vitriolatus acidus.* It is soluble in two waters at 60°, and less than one at 212°. It consists of 37 parts of sulphate of potass, and 33 sulphuric acid.

It is used in its unrefined state by silversmiths, and is recommended by Lowitz for preparing acetic acid, by decomposing acetate of soda. It promises to be a valuable medicine, as enabling us to give sulphuric acid in combination with

an aperient salt, and being less disagreeable and more soluble than the neutral sulphate.

SULPHAS POTASSÆ CUM SULPHURE; olim, SAL POLYCHRESTUS. *Ed.*

Sulphate of Potass with Sulphur; formerly *Polychrest Salt.*

Take of

Nitrate of potass in powder;

Sublimed sulphur, of each equal parts.

Mingle them well together, and inject the mixture, by little and little at a time, into a red hot crucible; the deflagration being over, let the salt cool, after which it is to be put into a glass vessel well corked.

IN this process the nitric acid of the nitrate of potass is decomposed by the sulphur, which is in part acidified. But the quantity of oxygen contained in the nitric acid is not always sufficient to acidify the whole sulphur employed; therefore, part of it remains in the state of sulphureous acid, which is probably chemically combined with part of the potass in the state of sulphite; for the whole saline mass formed is more soluble in water than sulphate of potass. It is crystallizable, and by exposure to the air gradually attracts oxygen, and is converted into sulphate, or perhaps supersulphate of potass; for even when recently prepared, it is manifestly acid. But this preparation, like all those depending on the uncertain action of fire, is apt to vary. In some experiments which I made to determine the state in which the sulphur existed in this salt carefully prepared, it seemed to be sulphuric acid; for it neither gave out a sulphureous smell on the addition of sulphuric acid, nor was a solution of it precipitated by acids. In others the presence of sulphuretted hydrogen was obvious; but in no instance could sulphur, in any notable quantity, be detected. Hence its Edinburgh name, *Sulphas potassæ cum sulphure*, and the mode of preparation proposed by some, of simply triturating these substances together, are manifestly incorrect. In its medical effects and exhibition, it agrees with sulphureous mineral waters, which contain a proportion of neutral salt.

TARTRIS POTASSÆ; olim, TARTARUM SOLUBILE. *Ed.*

Tartrate of Potass; formerly *Soluble Tartar.*

Take of

Carbonate of potass, one pound;

Supertartrite of potass, three pounds, or as much as may be sufficient;
Boiling water, fifteen pounds.

To the carbonate of potass, dissolved in the water, gradually add the supertartrite of potass in fine powder, as long as it raises any effervescence, which generally ceases before three times the weight of the carbonate of potass has been added; then strain the cooled liquor through paper; and, after due evaporation, set it aside to crystallize.

Potassæ tartras. *Lond.*
Tartrate of Potass.

Take of
Subcarbonate of potass, sixteen ounces;
Supertartrate of potass, three pounds;
Boiling water, one gallon.

Dissolve the subcarbonate of potass in the water, then add the supertartrate of potass in powder, until it cease to excite effervescence. Filter the liquor through paper. Then evaporate until a pellicle be formed, and set it aside to crystallize. Pour off the liquor, and dry the crystals on blotting paper.

Tartaras kali. *Dub.*
Tartrate of Kali.

Take of
Subcarbonate of kali, one pound;
Crystals of tartar, in very fine powder, two pounds and a half, or as much as will saturate the kali;
Boiling water, a gallon.

Gradually add the tartar to the subcarbonate of kali dissolved in the water; strain the liquor through paper, evaporate it, and let it crystallize by cooling.

The tartaric acid is capable of uniting with potass in two proportions, forming in the one instance a neutral, and in the other an acidulous salt. The latter is an abundant production of nature; but it is easily converted into the former, by saturating it with potass, or by depriving it of its excess of acid. It is by the former method that the colleges direct tartrate of potass to be prepared; and the process is so simple, that it requires little comment. For the sake of economy, we should come as near the point of saturation as possible; but any slight deviation from it will not be attended with much inconvenience. Indeed it is perhaps advisable to have a slight excess of acid, which, forming a small quantity of very soluble salt, leaves the remainder perfectly neutral. This is

the case in the process of the Pharmacopœia, as Mr Phillips says that 36 (30?) parts of supertartrate of potass require 15.7 of subcarbonate for their saturation, instead of 12, the quantity ordered. The evaporation must be conducted in an earthen vessel, for iron discolours the salt. It is easily crystallized, and the crystals become moist in the air. We have here a striking example of the change produced upon crystals, by saturating the excessive acid of a super-salt, the primitive form of the supertartrate being a rectangular octohedron, and of the tartrate a rectangular tetrahedral prism. It has an unpleasant bitter taste. It is soluble in four parts of cold water, and still more soluble in boiling water, and it is also soluble in alcohol. It is totally or partially decomposed by all acids. On this account it is improper to join it with tamarinds, or other acid fruits; which is too often done in the extemporaneous practice of those physicians who are fond of mixing different cathartics together, and know little of chemistry. It is also totally decomposed by lime, baryta, strontia, and magnesia, and partially by the sulphates of potass, soda, and magnesia, and by the muriate of ammonia.

Medical use.—In doses of a scruple, half a drachm, or a drachm, this salt is a mild, cooling aperient: two or three drachms commonly loosen the belly; and an ounce proves pretty strongly purgative. It has been particularly recommended as a purgative for maniacal and melancholic patients. It is an useful addition to the purgatives of the resinous kind, as it promotes their operation, and at the same time tends to correct their griping quality.

Carbonas sodæ. *Ed.*
Carbonate of Soda.

Take of
Impure carbonate of soda, any quantity.
Bruise it; then boil in water till all the salt be dissolved. Strain the solution through paper, and evaporate it in an iron vessel, so that after it has cooled, the salt may crystallize.

Dub.

Take of
Barilla, in powder, ten pounds;
Water, two gallons.
Boil the barilla in the water, in a covered vessel, for two hours, agitating it from time to time. Strain the liquor, and boil the barilla which remains, after triturating it again

with an equal quantity of water. This may be repeated a third time. Evaporate the leys, filtered and mixed, in a wide iron vessel, to dryness, taking care that the saline mass remaining be not again liquefied by too great a degree of heat, and agitate it with an iron spatula, until its colour become white. Lastly, dissolve it in boiling water; and, after due evaporation, let it crystallize by slow refrigeration. The crystals will be purer, if, before each boiling, the barilla be exposed to the air for some time. It should be crystallized when the air is at the freezing temperature, and in a liquor whose specific gravity is 1220.

If the salt be not pure, repeat the solution and crystallization.

Sodæ subcarbonas. *Lond.*
Subcarbonate of Soda.

Take of

Impure soda in powder, one pound;
Boiling distilled water, four pints.

Boil the soda in the water for half an hour, and filter. Evaporate the solution to two pints, and set aside to crystallize. Throw away the residuary liquor.

These directions are principally intended for the purification of the Spanish barilla, which is a fused mass, consisting, indeed, principally of carbonate of soda, but also containing charcoal, earths, and other salts. The two first causes of impurity are easily removed by solution and filtration, and the salts may be separated by taking advantage of their different solubility in cold and in hot water. But the preparation of carbonate of soda, by the decomposition of sulphate of soda, has now become a manufacture, and is carried to such perfection, that its further purification is almost unnecessary for the purposes of the apothecary.

The primitive form is an octohedron, with a rhombic base of 60° and 120°, the planes of which meet at the summit at 104, and at the base at 76°.

Sodæ subcarbonas exsiccata. *Lond.*
Dried Subcarbonate of Soda.

Take of

Subcarbonate of soda, one pound.

Apply a boiling heat to the subcarbonate of soda in a clean iron vessel, until it be perfectly exsiccated, stirring it continually with an iron spatula. Lastly, reduce it to powder.

Carbonas sodæ siccatum. *Dub.*
Dried Carbonate of Soda.

Liquefy, over the fire, crystals of carbonate of soda, in a silver crucible, and then, increasing the heat, stir the liquefied salt, until, by the consumption of the water, it become dry.

Reduce it to fine powder, and keep it in close vessels.

Subcarbonate of soda, deprived of its water of crystallization, is a very excellent remedy, for which we are indebted to Dr Beddoes; he desires it to be prepared by simply exposing the pounded crystals before the fire; which appears to be preferable to the process directed by the colleges, in which much of the carbonic acid may be expelled. By simple efflorescence, crystallized carbonate of soda loses more than half its weight, and falls down into a fine permanent powder. Whenever soda is prescribed in the form of pills, the effloresced carbonate is to be used, as, when made of the crystallized salt, they crack, and fall to pieces by the action of the air upon them.

Medical use.—Dr Beddoes first recommended the powder of effloresced soda, in calculous complaints, as a substitute for the supercarbonated alkaline waters, when these produced giddiness, or were too expensive; but its use has since been extended much farther; and it is found to be, not only an excellent antacid, but seems almost to possess specific virtues in affections of the urinary organs. One or two scruples may be given, in the course of the day, in the form of powder, or in pills made up with soap and some aromatics.

Sodæ carbonas. *Lond.*
Carbonate of Soda.

Take of
Subcarbonate of soda, one pound;
Subcarbonate of ammonia, three ounces;
Distilled water, a pint.

Add the ammonia to the subcarbonate of soda dissolved in the water; then apply a heat of 180°, in a sand bath, for three hours, or until all the ammonia be expelled. Lastly, set it aside to crystallize.

In the same manner evaporate the residuary liquor, and set it aside again to crystallize.

This salt bears the same relation to the subcarbonate of soda that the carbonate of potass does to its subcarbonate. Klaproth first described it, and says it consists of 39 carbonic acid, 38

soda, and 23 water. It is found native in hard striated masses in the province of Sukena in Africa, and is called *Trona*.

Mr Phillips objects on calculation to the quantity of carbonate of ammonia employed, as unnecessarily too large; for in subcarbonate of soda, the alkali is to the acid as three to two, and in the carbonate they are equal, and in 100 parts of crystals of subcarbonate are 35 of salt, consisting of 21 soda and 14 acid, requiring therefore 7 additional acid to neutralize it. Now, as 100 carbonate of ammonia contains 50 acid, it follows, that 14 will furnish the necessary acid, and that 25, the quantity ordered by the college, is excessive.

Aqua supercarbonatis sodæ. *Ed.*
Solution of Supercarbonate of Soda.

This is prepared from ten pounds of water, and two ounces of carbonate of soda, in the same manner as the solution of supercarbonate of potass.

By supersaturating soda with carbonic acid, it is rendered more agreeable to the palate, and may be taken in larger quantities, without affecting the stomach. This is now in common use as a cooling beverage, under the title of soda-water; and it may not be unnecessary to mention, that its place cannot be at all supplied by what is sold as soda powder, which is not a supercarbonate of soda, but merely a mixture of salts, which effervesces on being dissolved. Indeed, one moment's reflection must shew the impossibility of reducing to a solid form, a salt which cannot exist in solution, except under very great pressure.

Phosphas sodæ. *Ed.*
Phosphate of Soda.

Take of
Bones burnt to whiteness, and powdered, ten pounds;
Sulphuric acid, six pounds;
Water, nine pounds.

Mix the powder with the sulphuric acid in an earthen vessel; then add the water, and mix again: then place the vessel in a vapour bath, and digest for three days; after which, dilute the mass with nine pounds more of boiling water, and strain the liquor through a strong linen cloth, pouring over it boiling water, in small quantities at a time, until the whole acid be washed out. Set by the strained liquor, that the impurities may subside; decant the clear solution, and evaporate it to nine pounds. To this liquor poured from the impurities, and heated in an earthenware vessel, add carbonate of soda, dissolved in warm water, until the effer-

vescence cease. Filter the neutralized liquor, and set it aside to crystallize. To the liquor that remains after the crystals are taken out, add a little carbonate of soda, if necessary, so as to saturate exactly the phosphoric acid; and dispose the liquor, by evaporation, to form crystals, as long as it will furnish any. Lastly, the crystals are to be kept in a well-closed vessel.

Dub.

Take of

Burnt bones, in powder, five pounds;

Sulphuric acid, three pounds and a half, by weight.

Mix the powder, in an earthen vessel, with the sulphuric acid; gradually add five pints of water, and agitate the mixture; digest for three days, adding, from time to time, more water, to prevent the mass from becoming dry, and continue the agitation: then add five pints of boiling water, and strain through linen, pouring on boiling water repeatedly, until all the acid be washed out. Set aside the strained liquor until the feces subside, from which pour it off; and reduce, by evaporation, to one half: then add, of carbonate of soda (dissolved in a sufficient quantity of warm water), three pounds ten ounces. Filter; and, by alternate evaporation and cooling, let it form crystals, which are to be kept in a well-closed vessel.

If the salt be not sufficiently pure, dissolve and crystallize it again.

The first part of this process consists in destroying the gelatine of the bones, by the action of heat. When burnt to perfect whiteness, they retain their form, but become friable, and consist of phosphate of lime, mixed with a very little carbonate of lime and carbonate of soda. In performing this part of the process, we must take care not to heat the bones to a bright red, as by it they undergo a kind of semi-fusion, and become less soluble. The complete combustion of the charcoal is facilitated by the free contact of the air: we must, therefore, bring every part, in succession, to the surface, and break the larger pieces.

In the second part of the process, the phosphate of lime is decomposed by the sulphuric acid. This decomposition is, however, only partial. The sulphuric acid combines with part of the lime, and forms insoluble sulphate of lime. The phosphoric acid, separated from that portion of lime, immediately combines with the rest of the phosphate of lime, and

forms superphosphate of lime, which is not farther decomposable by sulphuric acid.

The superphosphate of lime, thus formed, is soluble in water; but, as the sulphate of lime, with which it is mixed, concretes into a very solid mass, it is, in some measure, defended from the action of water. On this account, the whole mass is directed to be digested, for three days, in vapour, by which means it is thoroughly penetrated, and prepared for solution in the boiling water, which is afterwards poured on it. It is probably to render the subsequent solution easier, that Thenard directs the bone-ashes to be made with water into a thin paste *(bouillé)*, before the sulphuric acid is added to them.

Having thus got a solution of superphosphate of lime, it is next decomposed by carbonate of soda, dissolved in water. This decomposition, likewise, is only partial, as it deprives the superphosphate of lime of its excess of acid only, and reduces it to the state of phosphate. The phosphate of lime, being insoluble, is easily separated by filtration, and the phosphate of soda remains in solution. According to Thenard, the nicest point in the whole process is the determination of the proper quantity of carbonate of soda to be added. As the phosphate of soda does not crystallize freely, unless there be a slight excess of base, he directs, that a little more carbonate of soda be added than what is merely sufficient to saturate the excess of acid in the superphosphate of lime, but not to continue the addition until it cease to produce any precipitate. We must also take care not to carry the evaporation of the solution of phosphate of soda so far as to form a pellicle; for it then concretes into an irregular mass, and does not form beautiful crystals. After each crystallization, we must examine the liquor which remains, and, if it be acid, or merely neutral, add to it a little of the solution of carbonate of soda. In this way, Thenard got from 2100 parts of bone ashes, 700 of sulphuric acid, and 667 of carbonate of soda, 885 of phosphate of soda. According to Fourcroy, phosphate of lime consists of 0.41 acid, and 0.59 lime, and superphosphate of lime of 0.54 acid, and 0.46 lime: phosphate of lime treated with sulphuric acid, is only deprived of 0.24 lime, and changed into 0.76 of superphosphate, consisting of 0.59 phosphate of lime, and 0.17 of phosphoric acid; and it is only with this portion of acid that we are able to combine soda. Fourcroy is also of opinion, that phosphate of lime requires only 0.4 of its weight of sulphuric acid to decompose it, whereas 0.6 are employed by the Edinburgh college, and 0.7

by the Dublin. This is not only, therefore, a waste of acid, but it renders the product impure, by being mixed with sulphate of soda, which is sometimes actually the case in the phosphate of soda of commerce. Besides, as bone-ashes are of very little value, it is better that a portion of them should escape undecomposed, than that an excess of acid should be added to them.

Mr Funcke, of Linz, has discovered a still more economical and expeditious method. It consists in saturating the excess of lime in calcined bones with diluted sulphuric acid, and then dissolving the remaining phosphate of lime in nitric acid. To this solution he adds an equal quantity of sulphate of soda, and then recovers the nitric acid by distillation. The phosphate of soda is then separated from the sulphate of lime, by the affusion of water and crystallization.

Phosphate of soda crystallizes in rhomboidal prisms, terminated by three-sided pyramids. Its taste resembles that of common salt. At 60° it is soluble in four parts of water, and at 212° in two. It effloresces in the air. By heat, it undergoes the watery fusion, and at last melts into a white mass. It consists, according to Thenard, of 15 phosphoric acid, 19 soda, and 66 water of crystallization. It is decomposed by most of the salts having an earthy base.

Medical use.—Phosphate of soda was introduced into the practice of physic by the ingenious Dr George Pearson of London. It possesses the same medical qualities as sulphate of soda, and the tartrate of potass and soda, being an excellent purgative, in the quantity of an ounce or ten drachms, and it has the peculiar advantage over these two salts, of being much less nauseous than they are. Its taste is extremely similar to that of common salt; and, when given in a bason of water gruel, or veal broth, made without salt, it is scarcely perceptible by the palate; and consequently it is well adapted for patients whose stomachs are delicate, and who have an antipathy against the other saline purges. The only objection to its general use is the very great difference between its price and that of sulphate of soda; a difference which might certainly be diminished.

Murias sodæ siccatum. *Dub.*
Dried Muriate of Soda.

Take of
Muriate of soda, any quantity.
Roast it over the fire in an iron vessel, loosely covered, until it cease to decrepitate, agitating it from time to time.

By this process, the muriate of soda is reduced into the state in which it is employed for the distillation of muriatic acid. It not only deprives it entirely of its water of crystallization, which, from being variable in quantity, would otherwise render the acid obtained unequal in strength, but also destroys some colouring matter which it contains; for, if we prepare muriatic acid from crystallized muriate of soda, we obtain a coloured muriatic acid, while the decrepitated muriate furnishes a perfectly colourless one.

Sulphas sodæ. *Ed.*
Sulphate of Soda.

Dissolve the acidulous salt, which remains after the distillation of muriatic acid, in water; and having mixed powdered chalk with it, to remove the superfluous acid, set it aside until the sediment subsides; then strain through paper the liquor decanted from them, and evaporate so that it may crystallize.

Sodæ sulphas. *Lond.*

Take of

The salt which remains after the distillation of muriatic acid, two pounds;

Boiling water, two pints and a half.

Dissolve the salt in the water, and gradually add as much subcarbonate of soda as will saturate the excessive acid. Evaporate until a pellicle appear, and, after filtering the liquor, set it aside to crystallize. Pour off the liquor, and dry the crystals on blotting paper.

Dub.

Dissolve the salt, which remains after the distillation of muriatic acid, in a sufficient quantity of boiling water. Filter the solution, and, after due evaporation, crystallize the salt by slow refrigeration.

The Edinburgh college do not preserve the superabundant acid, by saturating it with carbonate of soda, as the London college, but get rid of it by saturating it with carbonate of lime, with which it forms an insoluble sulphate of lime. In fact, the price of sulphate of soda is so very small, that it is no economy to use carbonate of soda to saturate the superabundant acid.

By far the greatest part of the sulphate of soda is obtained from manufacturers, as a result of processes performed for the

sake of other substances, as in the preparation of muriate of ammonia, oxygenized muriatic acid, &c. It may be economically obtained by making into a paste, with a sufficient quantity of water, eight parts of burnt gypsum, five of clay, and five of muriate of soda. This mixture is burnt in a kiln or oven, then ground to powder, diffused in a sufficient quantity of water, and, after being strained, is evaporated and crystallized.

The primitive form appears to be a right rhomboid prism of about 72 and 108.

Sulphate of soda crystallizes in six-sided prisms, terminated by dihedral summits. The crystals are often irregular, and their sides are usually channelled. Their taste is at first salt, and afterwards disagreeably bitter. They are soluble in 2.67 parts of water at 60°, and in 0.8 at 212°. In the air they effloresce. They undergo the watery fusion, and, in a red heat, melt. They consist of 23.52 sulphuric acid, 18.48 soda, and 58 water; and when dried at 700°, of 56 acid, and 44 soda. It is decomposed by baryta and potass, and salts containing these bases, and by the salts of silver, mercury, and lead.

Medical use.—Taken from half an ounce to an ounce, or more, it proves a mild and useful purgative; and in smaller doses largely diluted, a serviceable aperient and diuretic. It is commonly given in solution, but it may also be given in powder, after it has effloresced. In this form the dose must be reduced to one-half.

Tartris potassæ et sodæ; olim, sal rupellensis. *Ed.*
Tartrite of Potass and Soda, formerly *Rochelle Salt.*

It is prepared from the carbonate of soda and supertartrate of potass, in the same manner as the tartrate of potass.

Tartaras sodæ et kali. *Dub.*
Tartrate of Soda and Kali.

Take of

Carbonate of soda, twenty ounces;
Crystals of tartar, in very fine powder, two pounds;
Distilled water, boiling, ten pints.

Dissolve the subcarbonate of soda in the water, and gradually add the crystals of tartar; filter the liquor through paper; evaporate, and set it aside to crystallize by slow cooling.

Soda tartarizata. *Lond.*
Tartarized Soda.

Take of
Subcarbonate of soda, twenty ounces;
Supertartrate of potass, in powder, two pounds;
Boiling water, ten pints.

Dissolve the subcarbonate of soda in the water, and gradually add the supertartrate of potass. Filter the solution through paper; evaporate until a pellicle be formed, and set it aside to crystallize. Pour off the liquor, and dry the crystals on blotting paper.

The tartaric acid, in several instances, is capable of entering into combination, at the same time, with two bases. In the present example, the superabundant acid of the supertartrate of potass is neutralized with soda, and, in place of a mixture of tartrate of potass and tartrate of soda, each possessing their own properties, there results a triple salt, having peculiar properties.

The tartrate of potass and soda forms large and very regular crystals, in the form of prisms with eight sides, nearly equal, which are often divided longitudinally, almost through their axis. The principal form is a rhomboidal tetrahedral prism of 80° and 100°, with rhombic faces. It has a bitter taste. It is soluble in about five parts of water, and effloresces in the air. It is decomposed by the strong acids, which combine with the soda, and separate supertartrate of potass, and by baryta and lime. By heat its acid is destroyed. It consists of 54 tartrate of potass, and 46 tartrate of soda. Mr Phillips found that 18 parts of subcarbonate of soda were sufficient to neutralize 24 of supertartrate of potass.

Medical use.— It was introduced into medical practice by M. Seignette, an apothecary at Rochelle, whose name it long bore, and is still very much employed as an excellent purgative salt.

Aqua ammoniæ, olim Aqua ammoniæ causticæ. *Ed.*
Water of Ammonia, formerly *Water of Caustic Ammonia.*

Take of
Muriate of ammonia, one pound;
Quicklime, fresh burnt, one pound and a half;
Distilled water, one pound;
Water, nine ounces.

Pour the water on the powdered lime, contained in an iron or earthen vessel, which is then to be covered up until the

slaked lime cool. Then mix the muriate, previously ground into very fine powder, thoroughly with the lime, by triturating them together in a mortar, and immediately put the mixture into a retort of bottle glass. Place the retort in a sand-bath, and connect with it a Woulfe's apparatus. In the first and smallest bottle, furnished with a tube of safety, put two ounces of the distilled water, and in the second the rest of the distilled water.

The fire is now to be kindled, and gradually increased, until the bottom of the sand-pot becomes red, and no more ammonia comes over. Mix the fluid contained in each of the bottles, and preserve it in small phials, accurately closed.

Aqua ammoniæ causticæ. *Dub.*
Water of Caustic Ammonia.

Take of

Muriate of ammonia, sixteen ounces;
Lime, fresh burnt, two pounds;
Water, six pints.

Sprinkle one pint of the water upon the lime, placed in a stoneware vessel, and cover it up. Twenty-four hours afterwards, mix the salt with the lime, which will have crumbled to powder, taking care to avoid the vapours. Then put the mixture into a retort, and pour upon it the rest of the water. Having previously agitated them, draw off, with a moderate heat, twenty ounces, by measure, of liquor, into a refrigerated receiver, having luted carefully the joining of the vessels.

The specific gravity of this liquor is to that of distilled water as 936 to 1000.

Liquor ammoniæ. *Lond.*
Liquor of Ammonia.

Take of

Muriate of ammonia, eight ounces;
Fresh lime, six ounces;
Water, four pints.

Pour a pint of the water upon the lime; then cover the vessel and set it aside for an hour; afterwards add the muriate of ammonia and the rest of the water, previously heated to ebullition, and cover up the vessel again. Filter the liquor after it has cooled, and draw off by distillation twelve fluid-ounces of liquor of ammonia.

The specific gravity of liquor of ammonia is to that of water as 0,960 to 1,000.

The lime is slaked before it is mixed with the muriate of ammonia, in order that the heat generated during the slaking may not decompose the muriate when they are mixed before adding the water.

In this process, the muriate of ammonia is decomposed by the lime, in consequence of its having a stronger affinity for muriatic acid than ammonia has. It is absolutely necessary that the lime employed be very recently burnt, as the presence of carbonic acid would render the ammonia partially carbonated. This accident is also prevented by the great excess of lime used, which, having a greater affinity for carbonic acid than ammonia has, retains any small quantity of it which may be accidentally present. The water is essential to the existence of the ammonia in a liquid form; for, in itself, it is a permanently elastic fluid. In the process adopted by the Dublin college, a much greater quantity of water, however, is used than what is sufficient to absorb all the ammonia: the rest is intended to render the decomposition slower and more manageable, and to keep the muriate of lime, which remains in the retort, in solution; for otherwise it would concrete into a solid mass, adhering strongly to the bottom of the retort, very difficult to be washed out, and often endangering its breaking. A very small degree of heat is sufficient for the distillation, and the whole ammonia rises with the first portion of water, or even before it. It is therefore necessary that the vessels be very closely luted to each other, to prevent it from escaping. But this renders the utmost care necessary in the distillation; for too sudden, or too great a heat, from the rapid disengagement of gas, or even the expansion of the air contained in the vessels, would endanger their bursting.

In the process directed in the Edinburgh Pharmacopœia, this danger is completely obviated, by disengaging the ammonia in the form of gas, and combining it with the water, by means of pressure in a pneumatic apparatus. By this process, the water should be saturated with ammonia; but of this strength it is never sold in the shops, unless particularly inquired for, as, for common sale, it is always diluted with a certain proportion of water.

Dörfurt, Bucholz, and Van Mons, agree in recommending nearly the following process, which resembles that of the Edinburgh college. Slake 16 oz. of lime with a sufficient quantity of water to form a thick paste; put it into a cucurbit, and add 16 oz. of sal ammoniac; lute on the capital, furnished with a bent tube, reaching to the bottom of a receiver containing 24 oz. of water, and draw off 24 oz. so as to

fill the space of 48 oz. previously marked on the receiver, and keep it in phials perfectly closed, by dipping their necks when corked in wax.

We have already mentioned the properties of ammonia in its gaseous form. When combined with water, it imparts to it many of these properties, and lessens its specific gravity.

Table of the quantities of Real or Gaseous Ammonia in solutions of different Specific Gravities. (*Dalton.*)

Specific Gravity.	Grains of ammonia in 100 water grain measures of liquid.	Grains of ammonia in 100 grains of liquid.	Boiling point of the liquid. Fahr. scale.	Volume of gas condensed in a given vol. of liquid.
.85	30	35.3	26°	494
.86	28	32.6	38	456
.87	26	29.9	50	419
.88	24	27.3	62	382
.89	22	24.7	74	346
.90	20	22.2	86	311
.91	18	19.8	98	277
.92	16	17.4	110	244
.93	14	15.1	122	211
.94	12	12.8	134	180
.95	10	10.5	146	147
.96	8	8.3	158	116
.97	6	6.2	173	87
.98	4	4.1	187	57
.99	2	2	196	28

Sir Humphry Davy's results were somewhat different. He found 100 parts of sp. gr. 0.875, to contain 32.5 of ammonia; of sp. gr. 0.9054, 25.37; and of sp. gr. 0.9692, 9.5 of ammonia.

Water of ammonia decomposes many of the earthy, and all the metalline salts, and is capable of dissolving, or combining with, many of the metalline oxides, and even of oxydizing some of the metals. When pure, water of ammonia does not effervesce with any of the acids, or form a precipitate with alcohol. As it readily absorbs carbonic acid from the atmosphere, the Edinburgh college, very properly, order it to be kept in small phials. By neglecting this precaution in the shops, it often becomes carbonated before the large bottles, in which it is commonly kept, be half done.

Medical use.—Water of ammonia is very rarely given internally, although it may be used in doses of ten to twenty

drops, largely diluted, as a powerful stimulant in asphyxia, and similar diseases. Externally, it is applied to the skin as a rubefacient, and, in the form of gas, to the nostrils, and to the eyes, as a stimulant; in cases of torpor, paralysis, rheumatism, syncope, hysteria, and chronic ophthalmia.

ALCOHOL AMMONIATUM, olim SPIRITUS AMMONIÆ. *Ed.*
Ammoniated Alcohol, formerly *Spirit of Ammonia.*

Take of
Alcohol, thirty-two ounces;
Quicklime, recently burnt, twelve ounces;
Muriate of ammonia, eight ounces;
Water, eight ounces.

From these ingredients Ammoniated Alcohol is prepared, exactly in the same manner as the water of ammonia.

SPIRITUS AMMONIÆ. *Dub.*
Spirit of Ammonia.

Take of
Proof-spirit, three pints;
Muriate of ammonia, four ounces;
Potashes, six ounces.

Mix, and distil, with a slow fire, two pints.

Lond.

Take of
Rectified spirit, two pints.
Liquor of ammonia, one pint.
Mix them.

WHEN muriate of ammonia is decomposed by potashes, the product is a mixture of carbonate of ammonia, with a variable quantity of ammonia. Again, as diluted alcohol is employed in this process, and one half only is drawn off, it is evident that there is either a want of economy, or the whole alcohol comes over before any of the water. But if the latter supposition be true, there is also a want of economy, for the alcohol will dissolve only the ammonia, and leave the whole carbonate undissolved. The fact is, that when we perform the process as still retained by the Dublin college, a very large proportion of carbonate of ammonia sublimes, which remains undissolved in the distilled liquor; but as this liquor (after the particles of carbonate of ammonia which were diffused through it, have separated in the form of very regular crystals, adhering to the sides of the vessel) effervesces with acids, the distilled liquor cannot be pure alcohol, but

must contain a proportion of water capable of dissolving some carbonate of ammonia.

But, to prove the want of chemical knowledge in the contrivers of this process, it is only necessary to mention, that the product is unfit for the preparation of the aromatic ammoniated alcohol, as it will not dissolve the volatile oils.

The process now, for the first time, directed by the Edinburgh college, is therefore infinitely preferable, as it is not only more elegant, but more economical, and dissolves the volatile oils perfectly.

The Berlin college direct this preparation to be made by simply mixing two parts of alcohol with one of water of ammonia; and the London college have substituted this process for the unchemical one in their former edition. Mr Phillips objects to the new process, when made with the *liquor ammoniæ* so strong as it was in the Pharmacopœia 1809, its great difference in strength from that of the former Pharmacopœia, while its doses are still stated to be the same. For this error, not the college, but the commentators on its code, have to answer, and if we know the proportionate strength it may be rectified. In the editio altera 1815, the strength is reduced more than one half. Mr Phillips found, that when the spirit of ammonia, as prepared by the process 1809, had a sp. gr. of 0.914, the saturating power of a fluidounce as an alkali was equal to 95 grains of marble, whereas, by the former process, its sp. gr. was 0.845, and its saturating power 32 grains of marble; the former being three times as great as the latter, besides being caustic instead of subcarbonated. He has proposed to substitute another process, which shall be noticed in the remarks upon the Spt. Ammoniæ aromaticus.

CARBONAS AMMONIÆ, olim AMMONIA PRÆPARATA. *Ed.*
Carbonate of Ammonia, formerly *Prepared Ammonia.*

Take of
Muriate of ammonia, one pound;
Soft carbonate of lime (commonly called chalk), dried, two pounds.

Having triturated them separately, mix them thoroughly, and sublime from a retort into a refrigerated receiver.

Dub.

Take of
Muriate of ammonia, in powder, and well dried,
Dried carbonate of soda, of each half a pound.

Mix them, put them into an earthen retort, and sublime, with a heat gradually raised, into a cooled receiver.

Ammoniæ subcarbonas. *Lond.*
Subcarbonate of Ammonia.

Take of
Muriate of ammonia, one pound;
Prepared chalk, dried, one pound and a half.
Triturate them separately, them mix and sublime them with a gradually increased heat, until the retort become red.

In this process the two substances employed undergo a mutual decomposition, the muriatic acid combining with the lime or the soda, and the carbonic acid with the ammonia. The proportion of carbonate of lime directed by the Edinburgh college is more than sufficient to decompose the muriate of ammonia; but it is the safe side to err on; for it is only inconvenient, from obliging us to make use of larger vessels, and perhaps uneconomical, from requiring more fuel; whereas, if any portion of the muriate of ammonia were to remain undecomposed, it would sublime along with the carbonate, and render the product impure. Mr Phillips says, that 94 of carbonate of lime are sufficient to decompose 100 muriate of ammonia; but his experiments are not conclusive, as the results were obtained by calculation, and *lime* in solution was used. Göttling uses three parts of chalk to two of muriate of ammonia, but he dries his chalk before he weighs it. The chalk is always to be very carefully dried before it is used in this preparation, as the presence of moisture injures the product. The ingredients are to be thoroughly mixed by trituration, before they are introduced into the retort, that no part of the muriate of ammonia may escape decomposition; and we are even sometimes directed to cover the surface of the mixture, after they are in the retort, with powdered chalk. This, however, is unnecessary. Carbonate of lime does not act on muriate of ammonia till a considerable heat be applied. Göttling says, that the sublimation must be conducted in the open fire, and therefore he uses an earthenware cucurbit, with a tubulated capital. When a glass retort is employed, it should have a very wide neck; and the best form for the receiver is cylindrical, as it enables us to get out the carbonate of ammonia condensed in it without breaking it. The residuum which remains in the retort furnishes muriate of lime by lixiviation and evaporation.

By the Dublin college, carbonate of soda is employed for the preparation of carbonate of ammonia. The theory of the process is the same, and the decomposition is effected at

a lower temperature. But as soda is very rarely saturated with carbonic acid, part of the ammonia is evolved in the form of gas, which, if not permitted to escape, will burst the vessels. To prevent this loss, therefore, Mr Göttling uses a cucurbit and capital, furnished with a bent tube, which is to be immersed in a phial of water: by which contrivance, while the carbonate of ammonia is condensed in the capital, the gaseous ammonia is absorbed by the water. When soda is used, the residuum contains muriate of soda.

Carbonate of ammonia is obtained in the form of a white crystallized mass, of a fibrous texture, having the smell and taste of ammonia, but weaker. It is soluble in twice its weight of cold water; Mr Phillips says four times; its solubility is increased by increase of temperature; but when dissolved in boiling water, it loses a portion of its carbonic acid with effervescence. It is insoluble in alcohol. It is permanent in the air, and is not decomposed, but is easily vaporized by heat. It is said to vary very much in its composition, and to contain more ammonia, and less acid and water, in proportion to the high temperature employed in preparing it, the quantity of alkali varying from 50 to 20 *per cent.* It is decomposed by most of the acids, and all the alkaline, and some of the earthy bases; by the earthy sulphates, except those of baryta and strontia; by the earthy muriates and fluates; by the nitrates of baryta, and superphosphate of lime.

Medical use.—Carbonate of ammonia exactly resembles ammonia in its action on the living body; but is weaker, and is principally used as smelling salts in syncope and hysteria.

AQUA CARBONATIS AMMONIÆ, olim AQUA AMMONIÆ. *Ed.*
Water of Carbonate of Ammonia, formerly *Water of Ammonia.*
Take of
Muriate of ammonia,
Carbonate of potass, each sixteen ounces;
Water, two pounds;
Having mixed the salts, and put them in a glass retort, pour the water upon them, and distil to dryness in a sand bath, gradually increasing the heat.

Dub.
Take of
Muriate of ammonia, one pound;
Carbonate of soda, twenty-eight ounces;
Water, three pints.

Distil off by a heat, gradually raised, two pints.
The specific gravity of this liquor is 1095.

Liquor ammoniæ subcarbonatis. *Lond.*
Liquor of Subcarbonate of Ammonia.

Take of
Subcarbonate of ammonia, four ounces;
Distilled water, a pint.
Dissolve the subcarbonate of ammonia in the water, and filter through paper.

The nature of the last of these preparations is evident; and from its being more simple and uniform, and even economical, it is preferable to the former, for which it is a substitute, as the product in that case is also a solution of carbonate of ammonia, while the residuum in the retort is an alkaline muriate. In this instance, the decomposition of the muriate of ammonia cannot be effected by carbonate of lime, because the addition of the water prevents the application of the necessary heat, whereas alkaline carbonates act at a moderate temperature.

Liquor volatilis cornu cervini. *Dub.*
Volatile Liquor of Hartshorn.

Take of
Hartshorn, any quantity.
Put it into a retort, and distil, with a gradually increased heat, the volatile liquor, salt, and oil. Then repeat the distillation of the volatile liquor until it becomes as limpid as water, separating by filtration the oil and salt after each distillation. The liquor will be more easily purified, if, after each distillation, except the first, there be added about a sixth part of its weight of charcoal of wood previously heated to redness, then extinguished, by covering it with sand, and powdered while it is hot.
If hartshorn cannot be had, the bones of any other land animal may be substituted for them.

The wholesale dealers have very large pots for this distillation, with earthen heads, almost like those of the common still; for receivers they use a couple of oil jars, the mouths of which are luted together; the pipe that comes from the head is connected by means of an adopter with the lower jar, which is also furnished with a cock for drawing off the fluids condensed in it. The upper jar is entire, and in it is condensed the solid carbonate of ammonia. When a large quantity of the subject is to be distilled, it is customary to continue the

operation for several days successively; only unluting the head occasionally, to put in fresh materials. When the upper jar becomes entirely filled with carbonate of ammonia, it cracks. It is then to be removed, the salt to be taken out of it, and a fresh one substituted in its place.

When only a small quantity is wanted, a common iron pot, such as is usually fixed in sand furnaces, may be employed, an iron head being fitted to it. The receiver ought to be large, and a glass, or rather tin, adopter inserted between it and the head of the pot.

The distilling vessel being charged with pieces of horn, a moderate fire is applied, which is slowly increased, and raised at length almost to the utmost degree. At first water arises, which gradually acquires colour and smell, from the admixture of empyreumatic oil and ammoniacal salts; carbonate of ammonia next arises, which at first dissolves, as it comes over, in the water, and thus forms what is called the *spirit*. When the water is saturated, the remainder of the salt concretes in a solid form to the sides of the recipient. If it be required to have the whole of the salt solid, and undissolved, the water should be removed as soon as the salt begins to arise, which may be known by the appearance of white fumes; and that this may be done the more commodiously, the receiver should be left unluted, till this first part of the process be finished. The white vapours, which now arise, sometimes come over with such vehemence as to throw off or burst the receiver: to prevent this accident, it is convenient to have a small hole in the luting, which may be occasionally stopt with a wooden peg, or opened, as the operator shall find proper. Lastly, the oil arises, which acquires greater colour and consistency as the operation advances. Carbonate of ammonia still comes over, but it is partly dissolved in the hot oily vapour. At the same time, there is a considerable disengagement of gas, consisting of a mixture of carburetted hydrogen, often containing sulphur and phosphorus, and of carbonic acid.

All the liquid matters being poured out of the receiver, the salt, which remains adhering to its sides, is to be washed out with a little water, and added to the rest. It is convenient to let the whole stand for a few hours, that the oil may the better disengage itself from the liquor, so as to be separated first by a funnel, and afterwards more perfectly, by filtration through wet paper.

None of these products, except perhaps a small quantity of the carbonic acid, exist ready formed in the matter subjected

to the distillation, but are produced by a new arrangement of its constituents. For the production of ammonia, it is absolutely necessary that it contain nitrogen, or be what we have called a quaternary oxide. Although some vegetable, and most animal, substances are of this kind, yet only the most solid parts of animals, such as bone or horn, are employed for the production of ammonia; because they furnish it less mixed with other substances, are easily obtained, and at little expence, and are very manageable in the distillation. On the application of heat, as soon as all the water which they contained is expelled, their elements begin to act on each other, and to form binary, or at most ternary compounds. Water is formed of part of the oxygen and hydrogen, ammonia of nitrogen and hydrogen, carbonic acid of carbon and oxygen, then oil of hydrogen and carbon, while the superfluous carbon remains in the retort in the state of charcoal. As the formation of these substances is simultaneous, or in immediate succession, they are not obtained separately, but are mixed with each other. The water is saturated with carbonate of ammonia, and impregnated with empyreumatic oil, while the carbonate of ammonia is discoloured with oil; and the oil contains carbonate of ammonia dissolved in it. They may, however, be separated from each other, in a great measure, in the manner already described. But a small portion of oil obstinately adheres both to the salt and its solution, which constitutes the only difference between salt and spirit of hartshorn, as they are called, and the purer carbonate of ammonia, as obtained by the decomposition of muriate of ammonia.

AQUA ACETITIS AMMONIÆ, vulgo SPIRITUS MINDERERI. *Ed.*
Water of Acetite of Ammonia, commonly called *Spirit of Mindererus.*

Take of
Carbonate of ammonia in powder, any quantity.
Pour upon it as much distilled acetous acid as may be sufficient to saturate the ammonia exactly.

AQUA ACETATIS AMMONIÆ. *Dub.*
Water of Acetate of Ammonia.

Take of
Carbonate of ammonia, two ounces.
Add gradually, with frequent agitation, three pounds and a half of distilled vinegar, or as much as will saturate the ammonia, as proved by the test of litmus.

Liquor ammoniæ acetatis. *Lond.*
Solution of Acetate of Ammonia.

Take of

Carbonate of ammonia, two ounces;
Acetic acid, four pints.

Add the acid to the carbonate of ammonia until the effervescence cease, and mix.

The exact point of saturation should be ascertained by the alternate use of litmus and turmeric papers.

By this process, we obtain acetate of ammonia, dissolved in the water of the acetic acid: but as this is apt to vary in quantity, the solution also varies in strength, and the crystallization of the salt is attended with too much difficulty to be practised for pharmaceutical purposes. Its crystals are long, slender, and flatted, of a pearly white colour, and of a cool sweetish taste, are very deliquescent, melt at 170°, and sublime at 250°. It is decomposed by the acids, alkalies, and several of the earths, and metalline salts; and when in solution, its acid is decomposed spontaneously, and by heat. It is also decomposed by a solution of superacetate of lead. This was suspected to be owing to the vinegar employed being contaminated with sulphuric acid; but Mr Phillips has proved, that it arises from some of the carbonic acid remaining diffused through the solution.

Different proposals have been made to get a solution of greater strength and uniformity than that still retained by the British colleges. Mr Lowe saturates four ounces of carbonate of potass with distilled vinegar, and evaporates the solution to 36 ounces. He then mixes it with two ounces of muriate of ammonia, and distils the mixture in a glass retort. Acetate of ammonia comes over. The last edition of the Prussian Pharmacopœia prepares it by saturating three ounces of carbonate of ammonia with a strong acetic acid (obtained by distillation from acetate of soda, dissolved in two parts of water, and decomposed by sulphuric acid), and diluting the solution with water, so that it shall weigh twenty-four ounces. One ounce, therefore, contains the alkali of a drachm of carbonate of ammonia.

Medical use.—Acetate of ammonia, when assisted by a warm regimen, proves an excellent and powerful sudorific; and as it operates without quickening the circulation, or increasing the heat of the body, it is admissible in febrile and inflammatory diseases, in which the use of stimulating sudorifics are attended with danger. Its action may likewise be determined to the kidneys, by walking about in a cool air. The common dose is half an ounce, either by itself or in combination with other substances.