ÆTHEREA.

PREPARATIONS OF ETHER.

THE action of the strong acids on alcohol produces an order of compounds which possess both important chemical properties and medicinal virtues. These are named ETHERS, and agree in certain general properties, but vary in some of their qualities according as they are produced from different acids. They are all extremely volatile, and require to be preserved in closely-stopped phials.[1] The following are medicinally used.

ÆTHER SULPHURICUS, Lond. *Sulphuric Ether.*

"Take of Rectified Spirit, Sulphuric Acid, of each, *one pound and a half.* Pour the Spirit into a glass retort, and add the Acid gradually to it, shaking it frequently, and taking care that the temperature of the mixture do not exceed 120°, until it be completed. Then cautiously place the retort in a sand-bath, previously heated to 200°, that the liquor may boil as quickly as possible, and the ether pass into a tubulated receiver to which another receiver is adapted, which is to be cooled by ice or water. Distil until a heavier fluid begin to pass over, which is seen in the bottom of the receiver below the ether. Pour on the liquor which remains in the retort twelve fluid ounces more of Rectified Spirit, and distil another portion of Æther in a similar manner."

Edinburgh.

"Take of Sulphuric Acid, Alcohol, of each, *thirty-two ounces.* Pour the Alcohol into a glass retort, capable of sustaining a sudden heat; then pour the Acid on it in an uninterrupted stream. Mix them gradually by frequent and gentle agitation; then immediately distil from a sand-bath, previously heated for the purpose, into a receiver kept cold with water or snow. Let the fire be so regulated that the fluid may boil as soon as possible, and continue to boil until sixteen ounces shall have distilled over; then let the retort be removed from the sand-bath.

"To the distilled liquor, add two drachms of Potass; then distil again from a high retort, with a very gentle heat, into a receiver kept cold, until ten ounces have passed over."

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[1] The phial proposed by Dr. Dewar is the best for this purpose. It consists of a stopped phial, having a circular rim round its shoulder, not rising quite so high as the mouth of the bottle, and a glass cup with a heavy bottom, which, when inverted over the mouth of the phial, and mercury poured into the rim, hermetically closes it. *Annals of Phil.* vol. x. p. 20.

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"If sixteen ounces of Alcohol be added to the residuary acid after the first distillation, and the distillation repeated, ether will be reproduced. And this may be often repeated."

ÆTHER RECTIFICATUS, Lond. *Rectified Ether.*[1]

"Take of Sulphuric Ether, *fourteen fluid ounces;* Fused Potass, *half an ounce;* Distilled Water, *eleven fluid ounces.* First dissolve the Potass in two fluid ounces of the Water, and add the Æther to it, shaking them well together, until they be mixed; then, at a temperature of about 120°, distil from a large retort into a cooled receiver, twelve fluid ounces of ether: next shake the distilled fluid with nine fluid ounces of Water, and set it aside that the water may subside. Lastly, pour off the supernatant rectified Æther, and keep it in a well-stopped vessel."

ÆTHER SULPHURICUS, Dub. *Sulphuric Ether.*

"Take of Sulphuric Ethereal liquor, *twenty fluid ounces;* Subcarbonate of Kali dried and in powder, *two drachms.* Mix them, and distil from a high retort by means of a very gentle heat, into a receiver kept cold, twelve fluid ounces. The specific gravity of this fluid is to that of distilled water, as 765 to 1000."

Syn. Ether (*F.*), Schwefelätther (*G.*), Etere (*I.*).

The admixture of alcohol and sulphuric acid produces an almost instantaneous formation of ether, which is made sensible by the odour of the mixture; while by the mutual action of the spirit and the acid on each other a considerable evolution of caloric takes place, and the temperature of the mixture is raised to 180°. Whatever can encourage these effects in the first instance is to be avoided, as by the sudden rise of temperature, and the disengagement of ethereal vapours before the apparatus be adjusted, not only is the retort in danger of being broken, but a considerable waste of product also takes place. The proper mode for forming the mixture is undoubtedly that of the London College, if the retort be cooled after the addition of each portion of the acid. The retort should be thin, and the sand-bath previously heated to 200°, so that the liquor may boil immediately; for the ether is formed, and distils over at this temperature: whereas, by gradually raising the heat to this point, part of the alcohol comes over unaltered. The ether, as it distils, is condensed in the cool receivers, in the form of a colourless, limpid, transparent fluid; but towards the end of the operation, a white vapour also comes over, on the appearance of which the distillation should be stopped. The receivers ought to be ample, and kept cool with ice or snow, or cold water,

[1] Ether vitriolicus, P. L. 1787.

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which we have found to be preferable to ice or snow. The best mode of applying it is to lay narrow shreds of woollen cloth over the receivers, with one end of each immersed in a vessel of cold water placed higher than the receivers, by which means the water is made to trickle constantly over them; and, by the evaporation which it suffers, the receivers are kept in a sufficiently low temperature, and at the same time, the nature of their contents is distinctly seen, which cannot be conveniently done when they are immersed in snow, or ice, or even water. The luting which answers best in this operation is common paste, spread on slips of cloth, which are to be first applied, and when dry surrounded with pieces of wet bladder.

The product of the first distillation is Sulphuric Æther combined with water, some alcohol, and a small portion of sulphurous acid, forming an impure Æther of the specific gravity ·768; and that of the second distillation, or after the addition of a new portion of alcohol, is a similar Æther of the specific gravity ·807: on mixing these, a fluid of the specific gravity ·788 is obtained, which is the unrectified Æther of the present London Pharmacopœia.[1] By the rectification of this Æther according to the directions of the British Colleges, it is deprived of the sulphurous acid and nearly all the water, and its specific gravity reduced to ·732, or when highly rectified to ·725; but it still contains some water and alcohol, as Æther of a specific gravity so low as ·632 in the temperature of 60° is said to have been obtained.[2] The use of the alkali in the rectification is to separate and detain the acid and the water by its affinity for these substances; and this is still more completely accomplished by the addition of a portion of black oxide of manganese, which, by affording oxygen to the sulphurous acid, converts it into sulphuric acid, and thus renders it perfectly fixed at the temperature employed.

The theory of the formation of ether is still unsettled. It has been contended, that the balance of affinities between the constituents of the alcohol is broken by the acid, the oxygen of which attracting a portion of the hydrogen of the alcohol forms water; while a portion of its carbon, at the same time set free, forms the residuary black matter found in the retort;

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[1] *London Medical Review*, April 1810, p. 163.

[2] Lowitz procured ether of this gravity by the following process. To ether reduced to ·746 specific gravity by means of subcarbonate of potass in the usual method, he added as much dry powdered muriate of lime as it would dissolve. On standing, the mixture separated into two parts; the alcohol holding the salt in solution sunk to the bottom; the ether swam on the surface. When separated from the inferior liquor, its specific gravity was now only ·632 in the temperature of 60°. *Thomson's Chemistry*, 4th ed. ii. 443.

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and, by a new combination of the remaining hydrogen, carbon, and oxygen, the ether is produced. This explanation, however, which supposes a partial decomposition of the acid, has been denied by Fourcroy and Vauquelin, who, from a series of very ingenious experiments[1], concluded, that the acid suffers no decomposition, except towards the end of the process, which is to be attributed to the carbonaceous matter collected in the retort; but that it produces the decomposition of the alcohol without being itself decomposed, by the exertion alone of a disposing affinity. The ether, according to them, is the result of the new combination of the components of the alcohol, part of its oxygen and hydrogen first combining to form water, and a large portion of its carbon being separated without entering into any new combination; so that ether differs from alcohol only in containing a greater proportion of hydrogen and oxygen, and a smaller proportion of carbon. Thus, alcohol, according to the analysis of Saussure, is a compound of carbon 52·17, oxygen 34·79, and hydrogen 13·04 in 100 parts; whilst æther, according to the same chemist, consists of carbon 67·98, oxygen 17·62, and hydrogen 14·40: or, according to the atomic theory, alcohol consists of 2 atoms = 12, ether of 4 atoms = 24 of carbon; alcohol of 1 atom = 8, ether of 1 atom = 8 of oxygen; alcohol of 3 atoms = 3; ether of 5 atoms = 5 of hydrogen; making the weight of an atom of the former = 23, and that of an atom of the latter = 37. Several objections have been raised to this theory; but, in a work of this nature it is not necessary to enter minutely into theoretical discussions. The sulphurous and carbonic acids, and the charry residue formed in the process, are produced by the decomposition of a portion of the alcohol by the acid. Mr. Phillips says, that in using the proportions directed by the London College, he procured f℥xij of product, of which f℥xj¼ were Sulphuric Ether of specific gravity 0·768. On adding the second portion of Spirit, the ætherial product was equal to the former, but of specific gravity 0·807, showing that the power of the acid to produce ether was much diminished by the first operation.[2]

Qualities. — Æther has a fragrant, penetrating odour, and a hot, pungent taste. It is colourless and perfectly limpid; and is the most volatile of liquids, drying immediately if poured on the hand, and producing a great degree of cold by its evaporation. It boils in the open air at 96°, and in vacuo at 20°, a temperature 12 degrees below the common freezing point; and, but for the pressure of the atmosphere, would

[1] *Annales de Chimie*, xxiii. 203.
[2] *Trans. of the Pharmacopœia*, p. 224.

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always be in a gaseous form. When cooled down to — 46°, ether congeals in brilliant transparent plates. It is extremely inflammable, taking fire on the approach of any ignited body, a circumstance which requires to be attended to in pouring it from one phial to another by candle light. During its combustion, carbonic acid is formed, and traces of charcoal are left behind. It unites with alcohol in every proportion, and also readily mixes with ammonia; but ten parts of water take up or dissolve one only of ether. It dissolves balsams, wax, volatile oils, bitumens, camphor, extractive, gum-resins, resins, and sulphur in small proportions. It is decomposed by sulphuric acid, which converts it into sweet oil of wine.[1] Ether is sometimes adulterated; if it contain sulphuric acid from imperfect rectification, this may be detected by a precipitate being formed on the addition of solution of Barytes: when *alcohol* is present, a milky solution is formed with phosphorus, which is not the case when it is pure.

Medical properties and uses.—Sulphuric ether is stimulant, narcotic and antispasmodic. In its operation it resembles alcohol, but is more diffusible, and its effects are less permanent. It is beneficially employed as a cordial in typhoid and low fevers, particularly when nausea, subsultus tendinum, and other spasmodic symptoms are present. As an antispasmodic, it relieves the paroxysm of spasmodic asthma, whether it be taken into the stomach, or its vapour only be inhaled into the lungs; in which latter form it is also useful in simple dyspnœa and in catarrh. Much caution, however, is required in inhaling the vapour of ether, as the imprudent inspiration of it has produced lethargic and apoplectic symptoms. It is employed with advantage in hysteria, tetanus, cramp of the stomach, hiccough, and in cholera morbus, to check the vomiting; and also allays the violence of sea-sickness. The usual dose of sulphuric ether is from f℥ss. to f℥ij.; but it has been given in much larger doses with the most beneficial effects; and in all cases the dose must be repeated at short intervals to produce the full effect of the remedy. As an external application, ether acts either as a stimulant or a refrigerant, according to the mode in which it is applied. The first takes place when it is prevented from evaporating, by being confined over the spot to which it is applied; in which case it often proves useful in relieving headach and other muscular pains: and from its refrigerent effect produced by its rapid evaporation, it is applied to burns, and to assist in the reduc-

[1] When *sulphuric* and *muriatic ethers* are mixed together in equal proportions, the evaporation is very rapid, and a degree of cold considerably below 0 of Fahrenheit is produced.

tion of strangulated hernia. We have seen it produce almost immediate relief in ear-ach, when dropped into the external meatus.

Officinal preparations. *Spiritus Ætheris sulphurici*, L.

OLEUM ÆTHEREUM, Lond. *Ethereal Oil.*[1]

"After the distillation of Sulphuric Ether, distil again the remaining liquor with a gentle heat, until a black froth swells up; then immediately remove the retort from the fire. To the liquor in the retort, add water sufficient that the oily part may float upon it. Let this be skimmed off, and as much Lime-water be added to it as will neutralize any acid it may contain; and shake them together. Lastly take off the Ethereal Oil after it has separated."

LIQUOR ETHEREUS OLEOSUS, Dub. *Oily Ethereal Liquor.*

"Take what remains in the retort after the distillation of Sulphuric Ether. Distil to one-half, by a moderate heat."

Syn. Huile douce de vin (*F.*), Olco dolce di Vino (*I.*).

The product of both of these processes is a thick oily matter, of a yellow colour, slightly viscid; of sp. gr. 1·05, less volatile than ether, soluble both in ether and alcohol; but insoluble in water. After being kept for a few months, it becomes viscid, and prismatic crystals form in it, which are soluble in Ether and Alcohol; melt with a slight heat and sublime unaltered. In sulphuric acid they dissolve, forming a pink solution, in nitric a deep red: but they are soluble in muriatic and acetic acids and in the pure alkalies. Its nature is not clearly ascertained; for, although Fourcroy and Vauquelin consider it as similar to ether, and differing from it principally in containing a larger proportion of carbon; yet other chemists maintain that it is merely a compound of ether and sulphurous acid. From experiments made to ascertain its nature by Mr. Hennell, there appears to be much probability in his opinion, that it is a compound of sulphorinic acid, and the crystallizable oil already described.[2] It can be obtained more directly, although less economically, by distilling ether with a portion of sulphuric acid. It is used only for the preparation of the compound spirit.

Officinal preparation. *Spiritus Ætheris Sulphurici compositus*, L. D.

SPIRITUS ÆTHERIS AROMATICUS, Lond. *Aromatic Spirit of Ether.*[3]

"Take of Cinnamon Bark bruised, *three drachms*; Cardamom Seeds powdered, *a drachm and a half*; Long Pepper powdered, Ginger-root sliced, of each, *a drachm*; Spirit of

[1] Oleum Vini, P. L. 1787.
[2] *Journal of Science*, vol. xix. p. 96.
[3] Elixir Vitrioli dolce, P. L. 1745.

Sulphuric Ether, *a pint*. Macerate for fourteen days in a stopped glass-bottle, and strain."

ÆTHER SULPHURICUS CUM ALCOHOLE AROMATICUS, Edin. *Aromatic Sulphuric Ether with Alcohol.*

"Take of Cinnamon Bark bruised, Cardamom Seeds bruised, each, *an ounce*; Long Pepper bruised, *two drachms*; Sulphuric Ether with Alcohol, *two pounds and a half*. Digest for seven days, and filter through paper."

These preparations do not differ in their medicinal properties from the former; the aromatics rendering them only a little more grateful.

SPIRITUS ÆTHERIS NITRICI, Lond. *Spirit of Nitric Ether.*[1]

"Take of Rectified Spirit, *two pints*; Nitric Acid (by weight), *three ounces*. Add the Acid gradually to the Spirit, and mix them, taking care that the temperature, during the mixture, does not exceed 120°; then distil, by a gentle heat, twenty-four fluid ounces."

SPIRITUS ÆTHERIS NITROSI, Edin. *Spirit of Nitrous Ether.*

"Take of Alcohol, *three pounds*; Nitrous Acid, *one pound*; pour the Alcohol into a large phial placed in a vessel full of cold water, and add the acid gradually, with frequent agitation. Let the phial be slightly corked, and placed in a cool place for seven days; then distil the liquor by the heat of boiling water, into a receiver kept cool with snow or water, as long as any spirit comes over."

SPIRITUS ÆTHEREUS NITROSUS, Dub. *Nitrous Ethereal Spirit.*

"Add to the matter which remains after the distillation of Nitrous Ether, the Rectified Spirit of wine, employed in that operation for condensing the elastic vapour, and distil to dryness with the greater heat of a water-bath. Mix the distilled liquor with the alkaline liquor which remains after the separation of the Nitrous Ether, and also add as much dry Subcarbonate of Kali as shall be sufficient to saturate the predominant acid; which is to be determined by the test of litmus. Lastly, distil by the medium heat of a water-bath, as long as any fluid comes over. The specific gravity of this liquor is to that of distilled water, as 850 to 1000."

Syn. Alcool éthéreux par l'acide nitrique (*F.*), Atherischer saltpeter spiritus (*G.*), Spirito di nitro dolce (*I.*).

The products of the London and Edinburgh processes are in every respect the same; but the former is to be preferred on account of the length of time required by the latter. The small quantity of acid in proportion to the alcohol employed,

[1] Spiritus Nitri dulcis, P. L. 1745. Spir. Ætheris nitrosi, 1787.

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permits the mixture to be effected without any violent action taking place, or the evolution of much heat, provided the acid be added in small quantities and at intervals, and each portion be thoroughly mixed with the alcohol before another be added. The heat employed for the distillation should not exceed 212°, and it should be stopped as soon as twenty-four fluid ounces come over; for when it is longer continued, the product becomes coloured, and contains too much free acid.[1] The theory of the operation, inasmuch as relates to the production of the nitric ether, which is thus obtained in combination with a large proportion of unchanged alcohol and a small proportion of nitric acid, is nearly the same as that already detailed; except that a partial decomposition of the acid takes place. The entire product has the same relation to nitric ether as spirit of sulphuric ether has to sulphuric ether.

The product obtained by the first part of the Dublin process is analogous to the above. The acid which the residue of the distillation of nitrous ether contains, and the alcohol already impregnated with a small portion of that fluid, when mixed and heated, act reciprocally on each other, and a compound of nitric ether, unchanged alcohol, and free acid, distils over; but the alkali with which it is mixed before the second distillation, removing the acid, its properties, both as a chemical compound and as a remedy, must be necessarily altered. The products of the former processes are those which have been longest known and most extensively employed.

Qualities. — Spirit of nitric ether, as procured by the London or the Edinburgh process, has an extremely fragrant odour, and a pungent acidulous taste. Its spec. grav. should not exceed 0·834. It is very volatile and inflammable; and soluble in water and in alcohol. It coagulates tincture of Guaiacum, giving it at the same time a deep blue colour; and it also strikes a deep olive with solution of green sulphate of iron.[2] Nitric Ether, according to Thenard, consists of Carbon 28·45, Oxygen 48·52, Hydrogen 8·54 and Azote 14·49 in 100 parts. The proportions of this Ether in the Spirit has not been determined.

Medical properties and uses. — Spirit of nitric ether is refrigerant, diuretic, and antispasmodic. It has long been employed under the title of *Sweet Spirit of Nitre*, as a grateful refrigerant, and to quench thirst in febrile affections; for which purpose the dose is from ℥xx. to ℥xl. given in a cup-

[1] *London Medical Review*, April 1810, p. 164.

[2] Dr. Paris says (*Pharmacologia*), that this etherial spirit, when added in a small proportion to malt spirits, communicates to them a flavour resembling that of *French brandy*.

ful of water, or any other appropriate vehicle. In larger doses, it acts as a gentle stimulant to the stomach, relieving nausea and flatulence; and also determines to the kidneys, increasing the flow of urine; on which account it is advantageously prescribed as an auxiliary to other diuretics in dropsical complaints.

SPIRITUS ÆTHERIS SULPHURICI, Lond. *Spirit of Sulphuric Ether.*

"Take of Sulphuric Ether, *half a pint*; Rectified Spirit, *a pint*. Mix them."

ÆTHER SULPHURICUS CUM ALCOHOLE, Edin. *Sulphuric Ether with Alcohol.*

"Take of Sulphuric Ether, *one part*; Alcohol, *two parts*. Mix them."

LIQUOR ÆTHEREUS SULPHURICUS, Dub. *Sulphuric ethereal Liquor.*

"Take of Rectified Spirit of Wine, Sulphuric Acid, of each, *thirty-two ounces*. Let the Spirit heated to 120° be poured into a glass retort fit to bear a sudden heat, and add the Acid in an uninterrupted stream; let them be gradually mixed, and by means of a quick and sufficiently powerful heat, distil twenty ounces of the liquor into a receiver kept cool.

"If sixteen ounces of Rectified Spirit of Wine be poured on the residuary acid in the retort, more sulphuric ethereal liquor will be obtained by repeating the distillation."

In the old method of preparing this spirit by distilling the charge for sulphuric ether by a slow and gradually increased heat, an alcoholized ether was obtained, owing to part of the alcohol first passing over unaltered before the ether was formed, the specific gravity of which was ·768; but the gravity of the above mixture is ·816, showing that it contains considerably less ether in combination with the alcohol.

Medical properties and uses. — It may be used for the same purposes as the ether; but it is necessarily much less active. The dose is from f℥j. to f℥iij. An useful gargle for slight inflammation of the fauces is prepared by adding f℥j. of this spirit to f℥vj. of barley water, sweetened with f℥iv. of syrup of marsh-mallows.

SPIRITUS ÆTHERIS SULPHURICI COMPOSITUS, Lond. *Compound Spirit of Ether.*

"Take of Spirit of Sulphuric Ether, *a pint*; Ethereal Oil, *two fluid drachms*. Mix them."

Syn. Alcool éthéreux par l'acide sulphurique (*F.*), Atherischer Schwefelegeist Liquor (*G.*), Anodino minerale dell' Hoffmann (*I.*).

This is intended as a substitute for the *Anodyne Liquor of Hoffmann*; and, besides being stimulant and antispasmodic, it is supposed to possess anodyne properties. It is an useful ad-

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dition to tincture of opium, when given with the intention of procuring sleep; and often prevents the opium from exciting the nausea which it is apt to produce in some habits. The dose is from ʒss. to ʒij. in any appropriate vehicle.

8 ÆTHER NITROSUS, Dub. *Nitrous Ether.*

"Take of Nitrate of Kali, dried and coarsely powdered, *a pound and a half;* Sulphuric Acid, *a pound;* Rectified Spirit of Wine, *nineteen fluid ounces.* Put the Nitrate of Kali into a tubulated retort, placed in a bath of cold water, and pour upon it in small quantities, and at intervals, the Sulphuric Acid and the Spirit previously mixed together, and allow the mixture to become cold. Without any external heat, or at least a very gentle one, (such as may be communicated by the addition of a little tepid water to the bath,) an ethereal liquor will begin to distil. In a short time the heat of the retort will spontaneously increase, and a considerable ebullition take place, which must be moderated by adding some cold water to the bath. The receiver must also be kept cool with water or snow, and furnished with a proper apparatus for transmitting the very elastic vapour (arising from the mixture with great force, if the heat be too much increased) through a pound of Rectified Spirit of Wine in a phial which is to be kept cold.

"The Æthereal Liquor, thus spontaneously distilled, is to be put into a glass phial, fitted with a ground glass stopper, and as much Subcarbonate of Kali, dried, and in powder, is to be added as is necessary to neutralize the acid, closing the phial after each addition of the Kali, and determining the neutralization by the test of litmus: about a drachm of salt is generally sufficient for this purpose; and in a short time the Nitrous Ether will rise to the surface, and is to be separated by means of a funnel.

"If the Æther is required to be very pure, distil it again from a water-bath, at a temperature of 140°, to one-half. Its specific gravity is to that of distilled water, as 900 to 1000."

The action of nitric acid on alcohol is so violent, that the formation of ether which it affords, has always been regarded as a process of great difficulty, to obviate which, many ingenious plans have been suggested. The operation which has been just described, is admirably adapted for procuring it with facility and safety. It was contrived by Wolfe, and was found by Pelletier to succeed better than any other. The sulphuric acid and the spirit must be mixed with the same degree of caution as is necessary in preparing sulphuric ether; and the receiver must be larger, and kept perfectly cool, with the apparatus, described in the formulæ, attached to it, which

should be kept cool by a mixture of snow or ice and muriate of lime.

In the above process, the nitrate of potass is first decomposed, and nitric acid formed, which acts upon the alcohol as it evolves. The theory of this action is very obscure: but from a number of well-contrived experiments, Thenard was led to draw the following conclusions. Both the acid and the alcohol are decomposed; the oxygen of the former combines with a large proportion of the hydrogen, and a small quantity of the carbon of the alcohol, and thence result, "1st, Much water and nitrous oxide, and small quantities of carbonic acid, nitrous acid, and nitric oxide. 2dly, The separation of a small quantity of nitrogen, and the formation of much nitric ether by the combination in large quantity of the two elements of the nitric acid, with the alcohol from which the large proportions of hydrogen and small proportion of carbon have been abstracted. 3dly, The formation of acetic acid, and of a matter disposed to pass to the state of charcoal, by the combination, in certain proportions, of the hydrogen and carbon of the alcohol with the oxygen of the nitric acid."[1]

Qualities. — Nitrous, or rather Nitric Æther has a strong ethereal odour, but is less fragrant than sulphuric ether. Its taste is strong and peculiar; and its colour slightly yellow, probably arising from the presence of a small portion of nitric oxide. When highly rectified, its specific gravity is 0·866[2]. It is more volatile than sulphuric ether, boiling at a temperature of 70°, and consequently producing a greater degree of cold by its evaporation; and is very inflammable. It requires 48 parts of water for its solution, but combines with alcohol in every proportion; and readily absorbs nitrous and acetic acids, both of which acids are formed in it when it is kept for some time. According to the analysis of Thenard, the constituents of 100 parts of nitric ether are 48·52 of oxygen, 28·45 of carbon, 14·49 of azote, and 8·54 of hydrogen; but this analysis is liable to some exceptions.

Medical properties and uses. — Nitric Æther, although introduced into the Dublin Pharmacopœia, has not yet been generally used in practice; but it is probable that its properties are the same as those of sulphuric ether, and consequently it is applicable to the same cases.

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[1] *Murray's Chemistry*, 2d ed. iv. 447.
[2] Duncan, *New Edinburgh Dispensatory*, 5th ed. 567.