AQUÆ.

WATERS.

AQUA DESTILLATA, *L.D.E.*

Distilled Water.

Tests. — It remains clear on the addition of, 1. lime water; 2. chloride of barium; 3. nitrate of silver; 4. oxalate of ammonia; or, 5. hydrosulphuric acid.

1. proves the absence of carbonic acid or carbonate of ammonia; 2. of sulphate of lime; 3. of chlorides; 4. of lime; 5. of lead, from the worm through which it has been distilled.

Remarks. — When water is distilled, the first twentieth part should be thrown away, the remainder may be kept for use. The reason is, that many spring waters, and all rain water, contain a minute proportion of ammonia, which is carried over with the first portions distilled, and renders them unfit for use. The ammonia in rain water is derived from the atmosphere which always contains from 1 to 2 parts of this gas in 10,000,000. The source of it is the nitrogen and moisture of the air, which combine rapidly under the influence of electricity (lightning). The hydrogen of the water forming NH^3 (ammonia) with the nitrogen of the atmosphere. This fact was experimentally proved by Dr. Ryan, at the Polytechnic Institution, London. As springs are fed by rain water it is not difficult to account for the presence of ammonia from this source; and it also finds its way into springs, from the decomposition of animal and some vegetable matters in the soil; the ammonia thus formed is carried into the earth by showers, and so enters into wells. Spring and river waters contain also many other substances which unfit them for chemical uses, though they increase their value as articles of drink; of these, the most common and important are, *carbonate*, *muriate*, and *sulphate* of *lime; common salt;* and carbonic acid.

Many contain also *carbonate* of *iron*, which renders them *chalybeate*, and there are springs in several places, termed *mineral* or *medicinal*, from the quantity of medicinal ingredients present in them. Thus, some contain *sulphate* of *magnesia* (Epsom); and others, as those at Harrogate, Cheltenham, and Leamington, contain *sulphuretted hydrogen*, and very minute quantities (never more

than one grain in ten gallons, *Prout*) of iodide of sodium, in addition to the ingredients above named. *Stagnant* waters generally contain *light carburetted hydrogen*; and *quickly running streams* often contain an excess of *oxygen*. It is a curious circumstance that most *hot* springs, as those of Buxton, contain *nitrogen*. *Rain and snow water*, contain more *oxygen* than spring water; and according to Liebig, the first portions of rain which fall after a drought, contain a considerable quantity of *salts* of *ammonia*. *Sea water* always contains *chlorides* of *calcium*, *magnesium*, and *sodium*, and *sulphates* of the *same bases;* and a small quantity of *bromine* in the state of *bromide*, probably of *sodium* or *magnesium*, is invariably present. It also contains a minute quantity of *iodine* in the form of *iodides*. It is remarkable that though compounds of soda are present in most waters, yet potash is a very rare ingredient. Some waters contain a considerable quantity of organic matter, either dissolved or simply diffused through them, of which the Thames is a notable example. After being kept for some time, this undergoes a species of fermentation and the water becomes turbid and extremely offensive; after this change has taken place, a scum rises to the surface, and the water below, is pure, brilliant, and delicious. These effects are chiefly noticed at sea, as the water is obliged to be kept for many months, or years; and it is observed that no water is so good for a long voyage as that of the Thames. The change commences in about four or five months, if the ship is going into a hot climate, and is completed in two or three weeks. Some waters contain little but carbonate of soda; but these are very rare. A remarkably soft spring at Holbeck, near Leeds, contains nothing but this salt, and a trace of sulphuretted hydrogen.

Hard waters. — When water contains salts of lime or magnesia, they decompose soap when used in washing, and insoluble stearates and margarates are formed. (See SOAPS.) Such waters are said to be *hard*, and to *crack* the soap, and they generally feel harsh to the skin. Sometimes the salt of lime which is present, is carbonate, held dissolved by free carbonic acid. If such a water is boiled, the carbonic acid will be driven off, and the carbonate of lime becoming then insoluble, will be precipitated; the water will become opaque; and if allowed to stand, a deposit will form upon the bottom of the containing vessel. Such a water, therefore, will be rendered *soft* by *boiling*, inasmuch as the lime, which gave it its hardness, will be thus removed. In some part of the country this plan is successfully adopted; but it is occasionally applied with an exactly opposite result. If the hardness is owing to *sulphate* of *lime*, boiling will only increase it; for this salt is slightly soluble in water, and boiling will therefore only have the effect of concentrating the solution.

Soft waters. — This term is applied to those waters which are either free from saline ingredients, or contain so small a quantity, as not to produce any effect upon soap, when used in washing. Such waters as contain salts of soda are peculiarly soft and valuable.

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Analysis of Waters:

Gases. The amount of gases present may be ascertained by boiling a measured quantity of water in a flask furnished with a bent tube, and collecting the gas in a pneumatic trough. It may then be analysed. *Carbonic acid* will be detected by the precipitate formed when agitated with lime water. *Sulphuretted hydrogen* will be indicated by the smell, and the black precipitate formed when agitated with a solution of acetate of lead. *Light carburetted hydrogen*, by the formation of water and carbonic acid, when detonated with oxygen; and any residue after these operations may generally be estimated as *nitrogen.*

Carbonates will be detected by the formation of a precipitate on the addition of a solution of *baryta*, *lime*, or *acetate of lead*, which is redissolved by nitric acid.

Sulphates are shown by the precipitate formed on the addition of chloride of barium, which is not redissolved on adding nitric acid.

Chlorides are detected by the curdy, white precipitate on the addition of nitrate of silver. This salt is precipitated also by carbonates and sulphates; but the chloride of silver is not soluble in boiling nitric acid, whilst the carbonate is; and the sulphate of silver may be re-dissolved by simple dilution with water and boiling.

Iodides are detected with more difficulty, as they occur in small quantities. Evaporate the water nearly to dryness, by which most of the saline ingredients are separated by crystallisation. A *cold* solution of starch is to be mixed with the remaining solution, and nitric acid added, or a current of chlorine passed through the solution; if an iodide is present, a *blue* colour will be formed.

Bromides. The water is to be evaporated nearly to dryness, as before, and a current of chlorine passed through it. If a bromide is present, the solution will become yellow or brown, and the whole of the bromine will be dissolved on adding ether. To the ethereal solution, solution of potash should be added, and the ether expelled by heat. On the addition of *cold* solution of starch, and a few drops of nitric acid, a *yellow* colour will be formed.

Lime is shown by a white precipitate on the addition of oxalate of ammonia.

Magnesia forms a white crystalline precipitate on the addition of carbonate of ammonia and phosphate of soda. The precipitate does not form instantly.

Potash forms a yellow precipitate with bichloride of platinum, if the solution is moderately concentrated.

Soda is not easily detected. The solution must be evaporated to dryness, the deliquescent salts removed by alcohol, and the remainder dissolved by as small a quantity of water as possible. If soda is present, the solution will communicate a yellow colour to flame when treated as is directed under the tests of soda. (See METALLICA,—SODA.)

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Iron is sometimes sufficiently evident from the yellow or rusty precipitate formed when the water has been boiled or exposed for some time to the air. On the addition of a few drops of nitric acid and boiling, ferrocyanide of potassium will give a *deep blue* precipitate. Tincture of galls and solution of ammonia produce a black one.

From these statements, it is evident that common spring or river water is not fitted for making solutions of *nitrate of silver*, owing to the presence of chlorides or carbonates; of *chloride of barium*, owing to the presence of sulphates; or of the *salts of lead*, owing to the presence of sulphates or carbonates. *Oxalate of ammonia* also, cannot with propriety be dissolved in it, owing to the presence of lime.

Properties of distilled water. — It is colourless, inodorous, and insipid, in consequence of the absence of the air, which renders common water sparkling. It occasions no precipitate or cloudiness on the addition of acetate of lead, nitrate of silver, chloride of barium, oxalate of ammonia, or hydrosulphuric acid. A pint (f ℥xx) weighs 8,750 grains at 62° F., or 20 ounces avoirdupois.

Impurities. — Distilled water is not likely to be purposely adulterated; but it may contain various salts from spirting of the fluid, if the distillation is carried too far: and if the distilled water is *condensed* in a *worm made* of *lead*, it is certain to contain a portion of that metal. If long exposed, it will probably contain carbonic acid, absorbed from the air; and also sulphuretted hydrogen if it is kept in an open vessel in a laboratory. If made from *spring* water, it often contains carbonate of ammonia, which is derived from the decomposition, at the boiling point, of the salts of ammonia mentioned above, by the carbonate of lime present in the water; hence the first portions distilled often occasion a cloudiness on the addition of tests, and should be rejected.

Few chemists keep a still for the purpose of distilling water only; yet this ought to be done, or the distilled water will have a faint smell and taste of the last herbs, which had been subjected to distillation.

From the above remarks, it is evident that filtered water can scarcely ever be used as a substitute for distilled water, as the filtration cannot separate anything but mechanical impurities. Though distilled water is frequently ordered in prescriptions it is only imperatively required in making solutions of the *salts* of *lead; nitrate of silver; oxalate of ammonia;* the soluble *preparations* of *mercury; potash; solution of ammonia; iodide of iron; chloride of barium.*

"Distilled waters may be prepared from fresh, and generally, also from dried vegetables. In the latter case, only half the weight of materials should be used. They may also be prepared, for the most part, by agitating the volatile oils of the plants with water, and filter-

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ing the solution. But when obtained in this way, they have seldom so fine a flavour as when obtained from the plants themselves." (*E.*)

Remarks upon the distilled waters.—By distillation with water, many plants communicate their peculiar odour and flavour to the distilled fluid. These generally depend upon a volatile oil, or some other volatile fluid, which is dissolved by the water at the temperature of ebullition, and is retained when cold.

When long kept, and in some cases, very soon after their preparation, they become ropy and sour; and this change is generally said to be dependent upon a small portion of mucilage, which undergoes decomposition; but M. Simonnin has found the new formation to consist of an infinite number of "filaments confervoïdes," or species of vegetable bodies; and he has referred to a paper by Dr. Biazoletto, in which that eminent Italian naturalist has figured twenty-eight different species of these living growths.* The addition of a small quantity of spirit is intended to prevent the occurrence of this change; but Mr. Warrington attributes the acidity to this very addition, the alcohol being gradually converted into acetic acid. He kept distilled dill and anise waters, without spirit, for two years in a bottle which was occasionally opened and exposed to the air, and found that no change had taken place; but another portion of the same waters, to which the usual quantity of spirit was added, became acid in the course of a few months.†

Distilled waters are almost exclusively used as vehicles for the administration of more important medicines.

AQUA ANETHI, *L.E.*

Dill Water.

Take of Bruised dill, one pound and a half (℥xviii, *E.*).
Water, two gallons.
(Rectified spirit, f ℥iij, *E.*).
(Mix, *E.*), and let a gallon distil. Or,

Take of Oil of dill, two fluid drachms.
Powdered flint (or sand), two drachms.
Distilled water, a gallon.

* Journ. de Chemie Médic. extracted into the Pharm. Journ. Jan. 1842, p. 345.

† Proceedings of the Chem. Soc. extracted by the Pharm. Journ. June, 1845.

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Rub the oil diligently, first with the flint, and afterwards with the water, and strain the solution.

Remarks.—Dill water is only used as a carminative for children. It does not possess any properties which distinguish it from the carminative umbelliferæ generally.
Dose.—f℥j to f℥iv, as a vehicle for some other medicines.

AQUA ANISI, *D.*

Aniseed Water.

Take of Essence of anise, one fluid ounce.
Distilled water, half a gallon.
Mix, with agitation, and filter through paper.
Properties and dose.—Carminative. f℥j to f℥j, or f℥ij.

Aq. Carui; Cinnamomi; Fœniculi; Menthæ Piperitæ; Menth. Virid.; Menth. Pulegii; and Pimentæ, are prepared like Aq. Anisi, in the Dublin Pharmacopœia.

AQUA AURANTII FLORIS, *L. E.*

Orange Flower Water.

This is placed in the Materia Medica, being manufactured on a large scale by the distillation of orange flowers in water.
Uses.—Only for the sake of its odour.

Test.—It is not coloured by hydrosulphuric acid.

Orange water sometimes contains free acetic acid, derived from the flowers. If kept in a copper vessel, or distilled through a copper worm, it is liable to become slightly impregnated with copper; in which case, it would be coloured by hydrosulphuric acid.

AQUA CARUI, *L. D.*

Caraway Water.

Is to be prepared like Aq. Anethi.

Remarks.—*Aromatic; carminative.* Chiefly used as a vehicle for other medicines, as magnesia, in the flatulent colic of children.
Dose, f℥j to f℥ij.

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AQUA CASSIÆ, *E.*

Cassia Water.

Take of Cassia bark, bruised, eighteen ounces.
Water, two gallons.
Rectified spirit, three fluid ounces.
Mix, and distil off one gallon.
Remarks.—It is only used as a vehicle, for the sake of its flavour.

AQUA CINNAMOMI, *L.D.E.*

Cinnamon Water.

It is to be prepared like Aq. Anethi, *L.* (Aq. Cassiæ, *E.*).
Remarks.—It is only used as a vehicle, on account of its flavour.

AQUA FŒNICULI, *D.E.*

Fennel Water.

It is to be prepared with fennel, like Aqua Anethi.
Remarks.—*Aromatic; carminative.* Used in the same doses and for the same purposes as dill water. Its flavour is not so agreeable as that of carraway or dill.

AQUA LAUROCERASI, *E. D.*

Laurel (Cherry) Water.

Take of Fresh leaves of cherry laurel, one pound.
Water, two pints and a half.
Compound spirit of lavender, one fluid ounce (not in the *Ph. D.*)
Chop down the leaves, mix them with the water, distil off one pint; agitate the distilled liquid well; filter it, if any milkiness remain after a few seconds of rest, and then add the lavender water.
Remarks.—The lavender gives a colour which prevents this from being mistaken for common water. The preparation is liable to vary in strength from keeping, and the dose is very uncertain. From ʒss or ʒj, to above ℥j, have been given, several times, daily. It is very seldom used in medicine, but is employed by cooks to flavour blancmange, &c. It may be used in the cases requiring prussic acid, which see.

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LAUROCER'ASUS (PRUNUS), Cherry Laurel (Icosandria Monogynia; Amygdaleæ).

Description.—The leaves have no odour until they are bruised, when they evolve the smell of prussic acid or bitter almonds.

Composition.—When distilled with water a volatile oil is obtained in which hydrocyanic acid has been detected; but it is doubtful whether this oil exists prior to the application of the heat, or whether it is not produced by a change in the ingredients of the leaves under the influence of a high temperature.

Medicinal properties and uses.—*Sedative and narcotic*, and in large doses, poisonous. The leaves owe their properties to the prussic acid obtained from them, and the properties and uses are the same as those of that acid. Fatal accidents have arisen from the use of laurel water in sweetmeats.

AQUA MENTHÆ PIPERITÆ, *L.D.E.*

Peppermint Water.

Take of Peppermint, dried, two pounds.
(Rectified spirit, three fluid ounces, *E.*).
Water, two gallons.

Let a gallon distil. If the fresh herb has been employed, twice the weight must be used.

This water can be more quickly prepared from oil of peppermint, like Aqua Anethi.

Remarks.—All the mints are *stimulant*, *aromatic*, and *carminative*, and are used to relieve flatulence and griping, or to cover the taste of other medicines. They all contain volatile oil, to which they owe their value; and tannic acid, which causes a green colour with salts of iron. The distilled waters may be imitated extemporaneously by triturating a few drops of the essential oil with magnesia and sugar, in water, and filtering the mixture.

Properties.—Peppermint water is the most powerful and agreeable of all the mint waters.

AQUA MENTHÆ PULEGII, *E.* See Aqua Pulegii.

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AQUA MENTHÆ VIRIDIS, *L.D.E.*

Spearmint Water.

Synonyme. Aqua Menthæ Sativæ.

This is prepared in the same manner as Peppermint Water.

Properties.—It is feebler than peppermint, with which it agrees in general characters. It is supposed to be also *emmenagogue*, and is thought to check the secretion of milk.

AQUA PIMENTÆ, *L.D.E.*

Pimenta Water.

Take of Pimento, bruised, one pound.
Water, two gallons.
(Rectified spirit, three fluid ounces, *E.*).
Mix, and distil one gallon. May be prepared like Aq. Anethi.

It is *carminative*, and is used as a vehicle on account of its flavour.

AQUA PULEGII, *L.D.*

Pennyroyal Water.

Synonyme. Aqua Menthæ Pulegii, *Ph. L.* 1836.

It is prepared like Aq. Menthæ Piperitæ.

Properties.—It is supposed to be *emmenagogue* and *antispasmodic*, in addition to being *carminative*. It is popularly employed in obstructed menstruation, hysteria, and hooping cough.

AQUA ROSÆ, *L.D.E.*

Rose Water.

Take of Damask rose (petals), ten pounds.
Water, two gallons.
(Rectified spirit, three fluid ounces, *E.*).
Mix, and let one gallon distil.

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E. The petals should be preferred when fresh; but it also answers well to use those which have been preserved, by beating them with twice their weight of muriate of soda.

D. Take of essential oil of roses, ♏xx; distilled water, half a gallon. Mix, with agitation, and filter through paper.

ROSA CENTIFOLIA, Hundred-leaved Rose (Icosandria Polygynia; Rosaceæ).

Description.—It is neither easy nor of consequence to describe this rose, which is commonly cultivated in gardens. It resembles the damask rose, but it is not the same species, though it is sometimes translated as being so. The petals are more numerous, and of a deeper colour, than those of the Gallic and Dog roses.

Medicinal properties.—Rose water is much used as a solvent for astringent salts, as sulphate of zinc, when employed as collyria; and it is itself a valuable application in chronic injection of the conjunctiva, unaccompanied by any active inflammation.

Officinal preparations.—Aqua Rosæ.

AQUA SAMBUCI, *L.E.*

Elder Water.

Substitute elder flowers for rose leaves, and proceed as for rose water.

Remarks.—*Elder flowers* yield by distillation a small quantity of concrete volatile oil, which, according to Pereira, possesses no useful properties. It imparts flavour to the distilled water, for the sake of which alone, the water is used.

The *berries* are extensively made into a kind of wine, which is supposed to be *sudorific*, and is in popular use at the commencement of a catarrh, to check its further progress.

The *inner bark, and probably the leaves, are hydragogue, cathartic, and emetic.* They act with some violence. It is rather remarkable that the active parts of the plant should be the only ones which are not retained in the Pharmacopœia; as neither the bark, the leaves, nor the fruit are officinal.

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