No experiments have hitherto been made to ascertain the effects of carbonate of lithia when swallowed; they are at present, therefore, unknown. On account of its difficult solubility, its local action is not very energetic. Like the other alkaline carbonates, carbonate of lithia doubtless becomes absorbed, and is eliminated by the kidneys. Analogy would also lead us to infer that it is capable of rendering the urine alkaline. Although it is a constituent of many mineral waters, several of which are extensively consumed, its influence in them is quite unknown. It probably imparts very little activity to them, on account of the very minute proportion of it which they contain.

Attention has of late years been drawn to carbonate of lithia as a solvent for uric or lithic acid by Lipowitz,[1] Mr. Alexander Ure,[2] and Binswanger.[3] Lipowitz states, that one part of carbonate of lithia in 90 parts of water dissolved one part of uric acid at 122° F.; or four parts of uric acid at 212° F.: a solution of urate of lithia is formed while carbonic acid is evolved. Mr. Ure found that one grain of carbonate of lithia, dissolved in an ounce of distilled water, took up, at 98° F. (the heat of the blood), 2·3 grains of uric acid: and he says, that a human urinary calculus, composed of uric acid with alternate layers of oxalate of lime, lost five grains in weight by digestion for five hours in a solution of four grains of carbonate of lithia in an ounce of distilled water, at a blood-heat. And Binswanger states, that one part of carbonate of lithia, dissolved in 120 parts of water, takes up, at a blood heat, nearly four parts of uric acid. From the experiments of both Ure and Binswanger it appears that carbonate of lithia is a better solvent for uric acid, than either borax or the alkaline carbonates. The former has suggested the injection of a solution of carbonate of lithia into the urinary bladder as a lithonlytic, in calculi composed wholly or in part of lithic acid. "Of all the various menstrua hitherto recommended," says Mr. Ure, "none appears to promise more favourably than the carbonate of lithia, from the promptitude and energy with which, in dilute solution, it attacks calculi of this description. If by means of injections we can reduce a stone at the rate of a grain or more an hour, as the above experiment would lead us to anticipate, we shall not merely diminish the positive bulk of the calculus, but further loosen its cohesion; disintegrate it, so to speak, causing it to crumble down, and be washed away in the stream of urine. Cases may present themselves in which it may be expedient to conjoin the use of the lithontriptor; but only occasionally, and at long intervals. It is the frequency of repetition which renders that instrument so hazardous. It may be presumed, moreover, that the plan of throwing in a weak solution of this kind would generally exercise a beneficial influence in obviating irritation, by removing the sharp angular points and asperities of the broken fragments, where the practice of crushing is adopted."

It is probable that the internal employment of the carbonate of lithia might be resorted to with advantage in uric acid deposits. Aschenbrenner says it may be given in doses of from five to ten grains daily.

ORDER XIV. COMPOUNDS OF BARIUM.

Barium (Ba=69) is the metallic basis of the alkaline earth *baryta* (so called from βαρύς, *heavy*, on account of its great weight).

75. Barii Oxydum.—Oxide of Barium or Baryta.

Formula BaO. *Equivalent Weight* 77.

Baryta, also called *barytes*, or *heavy earth* (*terra ponderosa*) is the *protoxide of barium*. It is a greyish white or porous substance obtained by igniting nitrate of baryta. Its sp. gr. is about 4·7322. It forms with water a solid *hydrate of baryta* (BaO,HO), which is soluble in 20 parts of water at 60°, or 2 parts at 212°. From the hot solution *crystallised hydrate of baryta* (BaO,9HO) may be obtained.

[1] *Ann. der Chem. u. Pharm.* xxxvii. 348; and *Pharm. Central-Blatt für* 1841, p. 545.
[2] *Pharmaceutical Journal*, vol. iii. p. 71, 1843.
[3] Buchner's *Repertorium für die Pharmacie*, Bd. xlix. S. 199, 1848.

Baryta water (*aqua barytæ*) is used as a test for both carbonic and sulphuric acids, with each of which it forms a white precipitate; that with sulphuric acid being insoluble in nitric acid. Baryta combines with acids to form salts, several of which are used in medicine. Their chemical characteristics are as follows:—With the exception of the sulphate, all the barytic salts are soluble either in water only, or in dilute hydrochloric or nitric acid, and their solutions yield, with sulphuric acid or sulphate of soda, a white precipitate (BaO,SO^3) insoluble in nitric acid. The soluble barytic salts also furnish, with carbonate of soda, a white precipitate (BaO,CO^2). They likewise communicate a greenish yellow tint to the flame of either alcohol or pyroligneous spirit.

The characteristics of sulphate of baryta will be stated hereafter.

All the salts of baryta capable of solution in water or the juices of the alimentary canal are poisonous (see *barii chloridum*, and *barytæ carbonas*). Sulphate of baryta being insoluble is harmless: hence the antidote for baryta and its soluble salts is a solution of an alkaline sulphate, as sulphate of soda or sulphate of magnesia, or alum, by which the soluble barytic salt is converted into the insoluble sulphate (see *Barytæ Carbonas*).

76. BARYTÆ CARBONAS.—CARBONATE OF BARYTA.

Formula BaO,CO^2. *Equivalent Weight* 99.

HISTORY.—In 1783, Dr. Withering recognised the native carbonate, which has, in consequence, been called, after its discoverer, *Witherite*.

NATURAL HISTORY.—It is peculiar to the mineral kingdom.

Witherite occurs in the lead-mines of the North of England; as of Anglesark, in Lancashire. *Baryto-Calcite*, a compound of carbonate of lime and carbonate of baryta, is met with at Alston Moor, Cumberland.[1]

PREPARATION.—The native carbonate of baryta is sufficiently pure for the preparation of the other barytic salts. The pure carbonate may be prepared by the addition of a pure alkaline carbonate to a solution of chloride of barium. It may also be obtained by igniting (or boiling in water) finely-powdered sulphate of baryta with three parts of carbonate of potash, or carbonate of soda, and washing away the resulting alkaline sulphate.

PROPERTIES.—Native carbonate of baryta occurs massive, stalactitic, and crystallised. Its crystals belong to the right prismatic system. The sp. gr. of this mineral is 4·3. Heated before the blowpipe, it melts into a white enamel, with the evolution of much light, and the loss of a portion of its carbonic acid. The artificially prepared carbonate is a fine, tasteless, odourless, powder. It is almost insoluble in both hot and cold water; 4304 parts of cold, or 2304 parts of hot, water being required to dissolve one part of carbonate. It is more soluble in carbonic acid water.

Characteristics.—It dissolves with effervescence in hydrochloric acid: the evolved gas is carbonic. The solution is known to contain a barytic salt (BaCl) by the test for this class of salts.

COMPOSITION.—The following is the composition of this salt:—

	Atoms.	*Eq. Wt.*	*Per Cent.*	*Schaffgotsch.*	*Berzelius.*	*Berard.*
Baryta	1	77	77·7	77·63	77·9	78
Carbonic Acid	1	22	22·2	22·37	22·1	22
Carbonate Baryta	1	99	99·9	100·00	100·0	100

[1] For some curious anecdotes respecting its discovery at this place, see Parkes's *Chemical Essays*, vol. i. p. 324, 2d edit. London, 1823.

PURITY.—It should be white, odourless, tasteless, and entirely soluble in diluted hydrochloric or nitric acid, by which its freedom from sulphate of baryta is demonstrated. Neither caustic ammonia nor hydrosulphuric acid should produce any precipitate or change of colour in the hydrochloric solution, by which the absence of alumina and metallic matter (lead, iron, or copper) may be inferred. If excess of sulphuric acid be added to this solution, the whole of the baryta is thrown down in combination with the acid, and no precipitate should be occasioned by the subsequent addition of carbonate of soda, by which the absence of lime is shown.

"One hundred grains dissolved in an excess of nitric acid are not entirely precipitated with sixty-one grains of [anhydrous] sulphate of magnesia [or one hundred and twenty-five grains of the crystallised sulphate of magnesia]."—*Ph. Ed.*

PHYSIOLOGICAL EFFECTS. α. *On Vegetables.*—Germination does not take place in carbonate of baryta.[1]

β. *On Animals.*—Cows and fowls have been destroyed by swallowing the native carbonate.[2] Orfila[3] says a drachm of the powder killed a dog in six hours; but C. G. Gmelin[4] gave two drachms to a dog: vomiting took place, and the animal was well the next day. A drachm killed a rabbit in three hours. When applied to a wound it has proved fatal.[5] From the above experiments carbonate of baryta appears to act as an acro-narcotic poison: when swallowed it causes vomiting, inflames the alimentary tube, becomes absorbed, and acts specifically on the nervous system, causing convulsions, paralysis, and insensibility.

γ. *On Man.*—Only one case illustrating its action on the human subject has been published.[6] A young woman swallowed half a tea-cupful of the powdered carbonate: in two hours she had dimness of sight, double vision, ringing in the ears, pain in the head, and throbbing in the temples, a sensation of distension and weight at the epigastrium, distension of stomach, and palpitation. Subsequently she had pains in the legs and knees, and cramps in the calves. A day or two after, the cramps became more severe. These symptoms, slightly modified, continued for a long time.

USES.—Carbonate of baryta is employed in the preparation of the chloride of barium. It is not administered as a medicine.

ANTIDOTE.—A mixture of an alkaline sulphate (sulphate of soda or sulphate of magnesia) and diluted vinegar. (The use of the vinegar is to yield a soluble barytic salt, $BaO,\overline{A}$, on which the alkaline sulphate immediately reacts, and produces the insoluble sulphate of baryta.)

77. BARYTÆ SULPHAS.—SULPHATE OF BARYTA.

Formula BaO,SO^3. *Equivalent Weight* 117.

HISTORY.—Native sulphate of baryta, called *ponderous* or *heavy spar* (*spatham ponderosum*), was formerly confounded with sulphate of lime. In

[1] Vogel, in De Candolle, *Phys. Végét.* p. 1341.
[2] Parkes, *Chem. Essays*, vol. i. p. 330.
[3] *Toxicol. Générale.*
[4] *Versuche über d. Wirk. des Baryts*, &c. p. 8.
[5] Campbell, quoted by Christison, *Treatise on Poisons*, 3d edit. p. 532.
[6] Dr. Wilson, *Lond. Med. Gaz.* vol. xiv. p. 487.

1774, Scheele discovered baryta; and in the year following, Gahn analysed heavy spar, and found that it was composed of sulphuric acid and baryta.

NATURAL HISTORY.—It is peculiar to the mineral kingdom.

It frequently occurs crystallised in forms belonging to the right prismatic system. The crystals are commonly tabular. The *straight lamellar heavy spar* forms splendid groups of crystals. It occurs in Cumberland, Durham, and Westmorland. The *curved lamellar heavy spar* is generally known as *cock's-comb barytes*. It is common in Scotland, and Derbyshire. *Compact* or *earthy sulphate of baryta* occurs in Staffordshire and Derbyshire, and is called *cawk*. The *Bolognese spar*, from Monte Paterno, near Bologna, is *radiated sulphate of baryta*.

PROPERTIES.—Sulphate of baryta has a density of from 4·41 to 4·76. It is inodorous and tasteless. When pure, it is, in the pulverulent form, quite white. The form of its crystals has been before noticed.

"White or flesh-red; heavy; lamellar; brittle."—*Ph. Ed.*

Characteristics.—Before the blowpipe it decrepitates, but is not easily fused. "This difficult fusibility constitutes a good mark of distinction between this mineral and sulphate of lime or of strontian."[1] Ultimately, it melts into a hard, white enamel. It is insoluble in nitric acid. Reduced to powder, mixed with charcoal, and ignited, it is converted into sulphuret of barium, which, on the addition of hydrochloric acid, evolves sulphuretted hydrogen, and yields a solution of chloride of barium. (See *ante*, p. 608, for the tests for the barytic salts.)

COMPOSITION.—Sulphate of baryta has the following composition:—

	Atoms.	*Eq. Wt.*	*Per Cent.*	*Berzelius.*	*Klaproth.*
Baryta	1	77	65·8	65·643	66·7
Sulphuric Acid	1	40	34·2	34·357	33·3
Sulphate of Baryta	1	117	100·0	100·000	100·0

PHYSIOLOGICAL EFFECTS.—According to the experiments of Orfila,[2] it is inert.

USES.—Sulphate of baryta, on account of its cheapness, is the usual source from which the other salts of baryta are obtained; and on this account it has been introduced into the Edinburgh and Dublin Pharmacopœias. In its pure state it is sometimes employed as a pigment.

78. BARII CHLORIDUM.—CHLORIDE OF BARIUM.

Formula BaCl. *Equivalent Weight* 104·5.

HISTORY.—This compound was discovered by Scheele in 1675. It was at first termed *terra ponderosa salita*, and afterwards *muriate* or *hydrochlorate of barytes* (*barytæ murias*, E. or *barii chloridum*, L. D.)

PREPARATION.—Two of the British Colleges give directions for the preparation of this salt. No formula for its preparation is given by the *London College*.

[1] Dr. Thomson, *Outlines of Mineralogy, Geology, and Mineral Analysis*, vol. i. p. 104, Lond. 1836.

[2] *Toxicologie Générale.*

The *Edinburgh College* directs it to be prepared either by saturating dilute hydrochloric acid with pure carbonate of baryta, or as follows:—Take of Sulphate of Baryta, lb. ij.; Charcoal, in fine powder, ℥iv.; Pure Muriatic Acid, a sufficiency. Heat the sulphate to redness, reduce it to a fine powder, mix the charcoal with it thoroughly, heat the mixture in a covered crucible for three hours at a low white heat. Pulverise the product, put it gradually into five pints of boiling water; boil for a few minutes; let it rest for a little over a vapour-bath; pour off the clear liquor, and filter it if necessary, keeping it hot. Pour three pints of boiling water over the residuum, and proceed as before. Unite the two liquids; and, while they are still hot, or, if cooled, after heating them again, add pure muriatic acid gradually so long as effervescence is occasioned. In this process the solutions ought to be as little exposed to the air as possible; and, in the last stage, the disengaged gas should be discharged by a proper tube into a chimney or the ash-pit of a furnace. Strain the liquor, concentrate it, and set it aside to crystallise.

The *Dublin College* also prepares it by two different processes. The first process is as follows:—Take of Carbonate of Barytes, coarsely powdered, ℥x.; Pure Muriatic acid, f℥viij.; Distilled Water, as much as is sufficient. Dilute the acid with a pint and a half of the water, add the carbonate of barytes, and, when effervescence has ceased, evaporate to dryness. Transfer the residue to a Hessian crucible, and, having evaporated to a low red heat for twenty minutes, suffer it to cool, then reduce it to a coarse powder, and boil it for ten minutes with a pint and a half of water. Pour off the solution, boil the undissolved residue with ten additional ounces of water, and again decant. Pass the decanted solutions through a paper filter, and having evaporated the resulting liquid to the bulk of about fourteen ounces, suffer it to cool that crystals may be formed. The mother liquor, by further evaporation and cooling, will yield additional crystals.—Or, Take of Sulphate of Barytes, lb. iss.; Lamp Black, ℥iv.; Pure Muriatic Acid, f℥xiv.; Distilled Water, a sufficient quantity. Heat the sulphate of barytes in a covered crucible, and, while red hot, throw it into distilled water. Let it now, after being reduced to a very fine powder in the manner directed in the formula for *Creta Preparata*, be mixed intimately with the lamp-black, and exposed in a Hessian crucible for two hours to a strong red heat. The crucible being removed from the fire, and permitted to cool, its contents are to be reduced to a coarse powder, and boiled for fifteen minutes with two quarts of water, after which the solution is to be poured off on a paper filter. The undissolved residuum is to be again boiled with one quart of water, and the resulting liquor decanted on the same filter. To the filtered solutions, placed in a large capsule beneath a flue with a good draught, let the muriatic acid be gradually added, as long as it produces effervescence, and then, by means of a sand heat, evaporate to dryness. Boil the residuum with two quarts of water, pass the solution through a paper filter, and having evaporated it down to one quart, suffer it to cool that crystals may be formed. By further concentration, the mother liquor will yield additional crystals.

When hydrochloric acid and carbonate of baryta are mixed together, one equivalent of hydrochloric acid reacts on one equivalent of carbonate of baryta; and the products are—one equivalent of carbonic acid, which escapes; one equivalent of water; and one equivalent of chloride of barium.

$$BaO,CO^2 + HCl = BaCl + CO^2 + HO.$$

MATERIALS.		COMPOSITION.		PRODUCTS.	
1 eq. Carbonate Baryta	99	1 eq. *Carbonic Acid*	22	1 eq. Carbonic Acid	22
		1 eq. *Baryta* 77 — 1 eq. *Oxygen*	8	1 eq. Water	9
		1 eq. *Baryta* 77 — 1 eq. *Barium*	69		
1 eq. Hydrochl. Acid	36·5	1 eq. *Hydrogen*	1		
		1 eq. *Chlorine*	35·5	1 eq. Chloride Barium	104·5
	135·5		135·5		135·5

When a mixture of sulphate of baryta and charcoal is submitted to an intense heat, the carbon combines with the oxygen of the sulphuric acid and of the baryta, and forms carbonic oxide, which escapes. $BaO,SO^3 + 4C = BaS + 4CO$. The residue digested in water forms a solution of sulphuret of barium. On the addition of hydrochloric acid, hydrosulphuric acid gas is evolved, and the solution, by evaporation, yields crystals of chloride of barium. $BaS + HCl = BaCl + HS$.

PROPERTIES.—Chloride of barium crystallises in right rhombic plates or tables, sometimes in double eight-sided pyramids, which belong to the right prismatic system. To the taste, this salt is disagreeable and bitter. Its sp. gr. is 3·097. In dry warm air the crystals effloresce, but in the ordinary states of the air they undergo no change. When heated, they decrepitate, lose their water of crystallisation, and at a red heat fuse. At a white heat, according to Planiava, this salt is volatilised. It is soluble in both cold and hot water: 100 parts of water at 60° dissolve 43·5 of the crystallised salt,—at 222°, 78 parts. It is slightly soluble in ordinary rectified spirit, but it is nearly insoluble in pure alcohol. It is insoluble in strong nitric or hydrochloric acid.

Characteristics.—(See the tests for the *chlorides* and *barytic salts.*) Nitrate of silver added to a solution of chloride of barium causes a white precipitate (*chloride of silver*), soluble in ammonia, but insoluble in nitric acid. As a barytic salt, the chloride of barium is known by the following tests:—No precipitate is produced in a dilute solution of it by ammonia, hydrosulphuric acid, or ferrocyanide of potassium. But the soluble sulphates, phosphates, and carbonates, occasion with chloride of barium white precipitates (which are respectively *sulphate, phosphate,* and *carbonate of baryta*). The sulphate of baryta is insoluble in nitric and in nitro-muriatic acid. Chloride of barium communicates a greenish-yellow tint to the flame of alcohol.

COMPOSITION.—Crystallised chloride of barium has the following composition:—

	Atoms.	*Eq. Wt.*	*Per Cent.*	*Berzelius.*	*Phillips.*
Barium	1	69	56·326	85·201	85·5
Chlorine	1	35·5	28·980		14·5
Water	2	18	14·694	14·799	
Crystallised Chloride Barium	1	122·5	100·000	100.000	100·0

PURITY.—The crystals should be colourless, neutral to test paper, permanent in the ordinary states of the air (if they become moist or are deliquescent, the presence of chloride of calcium, or chloride of strontium, may be suspected), and their dilute aqueous solution should undergo no alteration of colour by the addition of ferrocyanide of potassium, hydrosulphuric acid, tincture of nutgalls, or caustic ammonia, by which the absence of metallic matter (as iron, lead, or copper) may be inferred. If excess of sulphuric acid be added, the filtered solution should be completely volatile when heated, and should occasion no precipitate on the addition of carbonate of soda, by which the absence of lime or magnesia is proved.

"One hundred grains in solution are not entirely precipitated by one hundred grains of [crystallised] sulphate of magnesia."—*Ph. Ed.*

PHYSIOLOGICAL EFFECTS. α. *On Vegetables.*—This salt is poisonous to plants.[1]

β. *On Animals.*—The action of chloride of barium on animals is, according to Sir B. Brodie,[2] analogous to that of arsenic. Locally, it operates as an irritant. After absorption, it affects the nervous system, the organs of

[1] Marcet, quoted by De Candolle, *Phys. Végét.*
[2] *Phil. Trans.* 1812, p. 205.

circulation, and the stomach. Its action on the nervous system is manifested by staggering, convulsions, paralysis, and insensibility; on the circulating system, by palpitations, with feeble and intermittent pulse; on the stomach, by vomiting, from its application to a wound. According to Sir B. Brodie, the affection of the stomach is slighter than that caused by arsenic.[1] It is eliminated by the kidneys.

7. *On Man.*—Administered in *small doses*, it at first produces no very obvious effects. In some cases the appetite appears to be improved. Soon we observe an increased secretion of urine, tendency to sweating, and not unfrequently loose stools; so that it appears to operate as a liquefacient. With no other obvious symptoms than these, glandular swellings or enlargements sometimes become softer and smaller: hence it is resolvent. If we persevere in the use of gradually-augmented doses, the appetite becomes disordered, nausea and vomiting, with not unfrequently griping and purging, come on; a febrile state, with dry tongue, is produced, the nervous system becomes affected, and the patient complains of giddiness and muscular weakness. Sometimes, according to Schwilgué,[2] under the continued use of it, catarrhal discharges from the eye, nose, and ear, take place; inflamed or suppurating lymphatic glands evince signs of an augmented excitation; wounds assume a more healthy appearance, and, in some cases, cicatrise.

In *large medicinal doses* very unpleasant effects have been occasionally observed from its use; such as vomiting, purging, sometimes griping, contracted pulse, giddiness, and great muscular debility, almost amounting to paralysis, with trembling.[3] In *excessive* or *poisonous doses* (as an ounce), the affection of the nervous system is more obvious. In one recorded case the symptoms were convulsions, pain in the head, deafness, and, within an hour, death.[4]

In conclusion, it may be observed that, considered medicinally, chloride of barium is most analogous to, though more powerful than, chloride of calcium, and is applicable in the same cases: regarded toxicologically, it may in some respects be compared to arsenic, but it acts less energetically on the stomach, and more rapidly on the nervous system, and causes death in a shorter time.

USES.—The principal medicinal use of chloride of barium is in the treatment of *scrofula*, for which it was introduced into medicine by Dr. Crawford in 1790,[5] and was subsequently used by Hufeland[6] with great benefit. The latter writer has employed it in all the forms of this disease, but especially in excited and inflamed conditions (particularly of delicate and sensible parts, as of the lungs and eyes), in painful ulcers, indurations which are disposed to inflame, and cutaneous affections. It has also been administered as a resolvent, deobstruent, or alterative, in some other diseases; for example, *scirrhus* and *cancer*, *cutaneous diseases*, *bronchocele*, &c. [Chloride of barium has been recently employed in strumous inflammation of the bones. M. Comyn[7] has adminis-

[1] See also the experiments of Orfila in the *Toxicol. Génér.*, and of C. G. Gmelin in his *Versuche über die Wirkungen*, &c.
[2] *Traité de Mat. Méd.* vol. i. p. 441, 3me éd.
[3] See an illustrative case in *Medical Commentaries*, xix. 267.
[4] *Journal of Science*, vol. ix. p. 382.
[5] *Medical Commentaries*, Dec. 2d, vol. iv. p. 433; and *Medical Communications*, vol. ii.
[6] *Erfahr. üb. d. Gebr. u. d. Kräfte d. salzs. Schwererde*, Berl. 1794; and *Vollst. Darstell. d. med. Kräfte u. d. Gebr. d. salzs. Schwererde*, Berl. 1794.
[7] *Bulletin Thérapeutique*, tom. xxxvi. p. 374.

tered this medicine in non-lymphatic strumous habits, for white swelling, and inflammatory affections of the bones. The dose has been one grain increased to ten grains, then gradually decreasing. At the same time the joints have been enveloped in mercurial plaster.—ED.] As a local application, a solution of it has been used as a wash in herpetic eruptions, and as a collyrium in scrofulous ophthalmia. In pharmacy and chemistry it is extensively employed as a test for sulphuric acid and the sulphates.

ADMINISTRATION.—It is used in the form of aqueous solution (see *liquor barii chloridi*).

ANTIDOTES.—The antidotes for the soluble barytic salts are the sulphates, which form with them an insoluble sulphate of baryta (see *ante*, p. 608). (In the absence of the alkaline sulphates, spring or well water which contains sulphate of lime may be copiously administered.) Of course the poison should be removed from the stomach as speedily as possible. To appease any unpleasant symptoms caused by the continued use of large medicinal doses, opiates may be employed.

LIQUOR BARII CHLORIDI L. D.; *Solutio Barytæ Muriatis*, E.; *Solution of Chloride of Barium.* (Chloride of Barium, ℥j.; Distilled Water, f℥j. *L. E.:* Chloride of Barium ʒj.; Distilled Water, f℥viij. *D.* Dissolve and filter through paper. The specific gravity of this solution is 1088.)—Dose of the solution, ten drops, gradually and cautiously increased until nausea or giddiness is experienced. It is chiefly employed as a test for sulphuric acid or the sulphates. Common water, and all liquids containing sulphates, carbonates, or phosphates, in solution, are incompatible with it.

79. Barii Iodidum.—Iodide of Barium.

Formula BaI. *Equivalent Weight* 195.

Hydriodate of Baryta (*Barytæ Hydriodas.*)—Obtained by decomposing iodide of iron by either baryta or its carbonate; or by adding baryta to hydriodic acid. (See *Potassii Iodidum.*)—Iodide of barium is a white or greyish white mass. It is very soluble in water and in alcohol; and its aqueous solution yields by evaporation acicular crystals of the hydrated iodide of barium. By exposure to the air, iodide of barium suffers decomposition: it absorbs carbonic acid, and yields a coloured mass of carbonate of baryta and periodide (iodureted iodide) of barium. It is a violent poison, and requires great caution in its use. "*Cautè, per deos, incede, latet ignis sub cinere doloso.*" It is a violent local irritant and corrosive (more powerfully so than the chloride of barium). It has been employed in medicine as an alterative, resolvent, and liquefacient, combining the effects of both baryta and iodine. It has been used in scrofulous and other swellings, in hypertrophies, and in chronic inflammation: in fact, in similar cases to those in which chloride of barium, iodine, and mercury, are given. The dose is $\frac{1}{3}$th of a grain, very cautiously increased to one grain, three times daily, dissolved in distilled water. Biett employed the *unguentum barii iodidi* (composed of iodide of barium, gr. iv.; and lard, ℥j.) as an application to scrofulous swellings.

80. BARYTÆ NITRAS.—NITRATE OF BARYTA.

HISTORY.—This salt was formed soon after the discovery of baryta.

PREPARATION.—It "is to be prepared like the muriate of baryta [chloride

[1] Jahn, quoted by Riecke, *Die neuern Arzneimittel*. p. 111, 1840.

of barium, see *ante*, p. 611], substituting pure nitric acid for the muriatic acid."—*Ph. Ed.*

PROPERTIES.—It crystallises in octohedrons. It is soluble in water, but insoluble in alcohol. It is entirely decomposed, with decrepitation, by a bright red heat, and furnishes pure baryta.

Characteristics.—As a nitrate, it is known by the tests for this class of salts already mentioned. The characters of the barytic salts have been before stated (see *ante*, p. 608).

COMPOSITION.—The crystallised salt is anhydrous. Its composition is as follows:—

	Atoms.	*Eq. Wt.*	*Per Cent.*	*Berzelius.*
Baryta	1	77	58·7	58·4
Nitric Acid	1	54	41·3	41·6
Nitrate of Baryta	1	131	100·0	100·0

PHYSIOLOGICAL EFFECTS.—Similar to those of the chloride of barium.

USES.—It is employed in chemistry and pharmacy as a test. Fire-work makers use it to communicate a green tinge to flame.

SOLUTIO BARYTÆ NITRATIS, E.; *Solution of Nitrate of Baryta.* (Nitrate of Baryta, 40 grs.; Distilled Water, 800 grs. Dissolve the salt in the water, and keep the solution in well-closed bottles.)—Employed as a test for sulphuric acid and the sulphates. It is analogous in its action to a solution of the chloride of barium; but is employed when it is considered desirable to avoid the presence of a metallic chloride.

ORDER XV. COMPOUNDS OF CALCIUM.

Calcium (Ca=20) is the metallic base of the alkaline earth, *lime*. It is extensively distributed in both the inorganic and organic kingdoms.

81. CALX.—LIME.

Formula CaO. *Equivalent Weight* 28.

HISTORY.—Lime, and the mode of obtaining it by burning the carbonate, were known in the most remote periods of antiquity. Hippocrates[1] employed this earth in medicine. Dr. Black, in 1755, first explained the nature of the process for making it. In 1808, Davy showed that this substance was a metallic oxide; and hence it has been termed the *oxide of calcium*. It was formerly denominated *calcareous earth*. To distinguish it from the hydrate of lime, it is called *caustic lime*, or *quicklime* (*calx viva*), or *burned lime* (*calx usta*).

NATURAL HISTORY.—It occurs in both kingdoms of nature.

a. IN THE INORGANISED KINGDOM.—In the mineral kingdom, lime is found in the form of carbonate, sulphate, phosphate, silicate, arseniate, tungstate, borate, and titanate. Its base, calcium, occurs in combination with fluorine. "Lime is also disseminated through

[1] *Popularium*, ii. sect. 5.