Salt Petre - brought from East Indies - the British monopoly.

Matter under heat and moisture loses its chemical properties and decomposes into ammonia and nitrogen, forming nitrate of boric acid which is dissolved by rain or water, and decompounds by dilution into nitrate of lime and dry ash; wood ashes furnish carbonate of potash which converts it into salt petre. Hence plastering of stables, etc.

Horse dung - Pedlar's dung &c. produce it. In tropical climates, the nitrate of lime is dug in an earth under offseason.

Lunar caustic or nitrate of silver also Hair dye.

Chloride of lime may be made if made but if too much heat it becomes chloride of calcium. The oxygen of calcium being driven out by superior stuff of the Chlorine.
The double sulphate of soda and lime is the mineral called glauberite.

The double sulphates that constitute alum have already been spoken of.

422. The Salts of Nitrogen. — These are the hyponitrites, $M\cdot NO_3$, the nitrates, $M\cdot NO_3$, and the nitrates, $M\cdot NO_3$.

423. The nitrates are all soluble in water, and it is for this reason difficult to detect their presence by any reagent. When chlorohydric acid is mixed with a nitrate, it is decomposed and chlorine is disengaged; the presence of which may be ascertained by its dissolving gold leaf. This test is not, however, a decisive one, where there is ground to suspect the presence of iodates, chlorates, seleniates, or bromates, as they exhibit the same appearance. The vegetable alkali, morphia, acquires an orange-red colour by the action of nitric acid, and may be used as a test of the presence of any of its combinations. The supposed nitrate is heated in a test tube with a drop of sulphuric acid, and then a crystal of morphia is added.

The only means of obtaining nitric acid, is by the decomposition of some one of its salts.

The nitrates of potassa, soda, lime, and magnesia, are found native, and their nitric acid appears to be formed, either during the decomposition of animal and vegetable bodies, or by the same kind of corpuscular action by means of which platinum promotes the combination of oxygen and hydrogen. They are found to be spontaneously generated in the soil in various parts of the world, and are artificially prepared by mixing calcareous earth with animal and vegetable remains. Nitric acid is generated during the decomposition of the organic matter, and combines with the earthy or alkaline bases which are present.

424. All the nitrates are decomposed by a high
temperature, and yield oxygen and nitrous acid, which cause the rapid combustion of any combustible or oxidable bodies that may be present. The phenomenon is called deflagration, and is generally performed by mixing equal quantities of the inflammable substance and the nitrate, and projecting them in small portions into a red-hot crucible.

The most useful of these salts, is nitrate of potassa, or nitre, as it is usually termed. It is a powerful antiseptic, and is much employed in preserving meat and animal matters from decomposition. It is used in the preparation of nitric acid, and in the manufacture of gunpowder, which is prepared by the intimate trituration and levigation together of 12.5 parts of sulphur, 12.5 of charcoal, and 75 of nitre. The theoretic constitution of the best gunpowder is $S_2Cl_5KNO_6$, the decomposition of which produces sulphuret of potassium, and more than 1000 times its volume of nitrogen and carbonic acid gas.

425. The nitrate of silver is used as a caustic under the name of lunar caustic. It communicates a deep brown indelible stain to vegetable and animal substances, and is the basis of most of the indelible inks.

426. The Salts of Chlorine.—These are the hypo-chlorites, $M\cdot ClO_2$, the chlorites, $M\cdot ClO_3$, the chlorates, $M\cdot ClO_4$, and the perchlorates, $M\cdot ClO_5$.

427. The hypochlorite of lime is supposed to be the active element of the bleaching powder, which is sold under the name of chloride of lime. This powder, when properly prepared, consists of chlorine, oxygen, and lime, in their atomic proportions, and is probably a mixture of the hypochlorite of lime and the chloride of calcium, which may be represented by $Ca\cdot Cl\cdot O_2+Ca\cdot Cl$.

428. The chlorates contain the same proportions of oxygen in the acid and base as the nitrates: viz. $MO+ClO_3$; and are very analogous to them. They are decomposed at a red heat, being resolved into a
metallic chloride, and yielding all their oxygen in the gaseous form. They deprecate with inflammable substances more violently than the nitrates; a mixture of one part of sulphur, and three parts of chloride of potassa, explodes when struck between two hard substances. A mixture of this, with a little charcoal or gunpowder, is sometimes used for the percussion caps for guns, but it is said to corrode the lock. A sulphur match, coated with a mixture of gum or sugar and chloride of potassa, takes fire from the decomposition of the chlorate, when it is dipped in sulphuric acid, and is much used as a means of obtaining fire.

The chlorates are mostly very soluble salts.

The chlorate of potassa is obtained by passing chlorine gas through a mixture of two parts by weight of carbonate of potassa, and one part of hydrate of lime. By digesting the mass in water when saturated with chlorine, the solution is found to contain chloride of potassium and chlorate of potassa, which may be separated by crystallization. The reaction which takes place may be thus stated; 6 K, CO₃, and 6CaO, HO, acted on by 6Cl, produce 5KCl; 6Ca,CO₃, and KClO₃, while 6Aq are evolved.

429. The Salts of Phosphorus.—These salts are the hypophosphites, M, P₂O₃, the phosphites, M, P₃O₄, the monobasic phosphates, M, P₂O₅; the dibasic phosphates, M₂, P₂O₇, M+H, P₂O₇; and the tri-bASIC phosphates, M₃, P₂O₉, M₂+H, P₂O₉, M+H₂, P₂O₉.

430. The several species of phosphates form one of the most remarkable and interesting groups of salts known to the chemist. The constitution of these salts has been most accurately studied in the case of the phosphates of soda, of which there are no fewer than six: namely, the monobasic phosphate, or metaphosphate, Na, P₂O₅; the two dibasic-
phosphates, or pyrophosphates, Na$_3$P$_2$O$_7$ and Na$+$H, P$_2$O$_7$; and the three tribasic, or common phosphates, Na$_3$P$_2$O$_8$, Na$_2$+H, P$_2$O$_8$ and Na$+$H$_2$, P$_2$O$_8$.

431. The common phosphate of soda of the shops, is the tribasic phosphate, with an atom of hydrogen, Na$_2$+H, P$_2$O$_8$. It is generally called the rhombic phosphate, and is manufactured in large quantities. It is alkaline to test paper, and crystallizes in oblique, rhombic prisms. When this salt is mixed with nitrate of silver, one equivalent of the yellow tribasic phosphate of silver is precipitated, and two of nitrate of soda, and one of free nitric acid, or rather of nitrate of hydrogen, remain in solution; the statement of this change being that Na$_2$+H, P$_2$O$_8$ and 3 Ag, NO$_3$, yield Ag$_3$, P$_2$O$_8$, 2 Na, NO$_3$, and H, NO$_3$.

432. By the addition of pure soda to its solution, this salt is converted into the tripophosphate, Na$_3$ P$_2$O$_8$, which crystallizes in slender prisms, having a strong alkaline taste. This salt throws down the yellow tripophosphate of silver from the nitrate, three atoms of nitrate of soda being left in the solution, which is neutral.

433. When phosphoric acid is added to the rhombic phosphate, a new salt is obtained, of which the formula is Na$+$H$_2$, P$_2$O$_8$. It is very soluble, has an acid taste, and reddens litmus paper. With three equivalents of nitrate of silver, this salt yields one of the yellow tripophosphate of silver, one of nitrate of soda, and two of nitrate of hydrogen, or nitric acid.

434. By heating the rhombic phosphate to a red heat, it is decomposed, an atom of water is evolved, and a new and less soluble salt is obtained, which is neutral to test paper, and which is the bi-basic phosphate or di-pyrophosphate; its formula being Na$_2$ P$_2$O$_7$. When an equivalent of this salt is mixed with two of nitrate of silver, a snow-white granular precipitate is formed, which is the bi-basic phosphate.
used occasionally as a cathartic

from burnt bone & sulphur acid as
in making phosphorus - The Phos
acid instead of being de-oxygenized
by charcoal & heat, is neutralized
by carbonate of soda from which
the salt is crystallized

Explose 1 sulphur
& 3 chlorine & phoe
on air

The old deh water

R, CO3 is carbonate rock

more from their
complexity & difficulty
in unravelling their
formation

...
or di-pyrophosphate of silver, and two atoms of nitrate of soda remain in the neutral solution.

435. When the tribasic phosphate, represented by Na₃H₂₅P₂O₇, is heated to 400°, it loses one atom of hydrogen, and when the heat is raised above 600°, it loses the elements of water, and is left as a simple pyrophosphate of soda, Na₃P₂O₇. Its solution is neutral to test paper; it decomposes two equivalents of nitrate of silver, precipitating the snow-white granular di-pyrophosphate, and leaving one atom of nitrate of soda and one of free nitric acid, in the solution.

436. When this last salt is heated to low redness, it is converted into the monobasic phosphate or metaphosphate of soda, which is a very soluble, deliquescent, transparent glass, and reddens litmus paper. When mixed with an equivalent of nitrate of silver, gelatinous flakes which cohere into a soft mass by being heated, are precipitated. This is the monobasic phosphate or metaphosphate of silver.

437. It thus appears that these acids are distinct species, and carry their specific differences into their saline combinations. On the old theory of salts, the differences between the above phosphates is stated to consist in the greater or less number of atoms of basic water.

These acids form corresponding salts with the other bases; those of potash and lime have been examined. The triphosphate of lime is formed as a mineral in large mountain masses.\(^\text{x}\)

438. The Salts of Arsenic.—These salts are the arsenites M, As₂O₃, the monobasic arseniates, M₃As₂O₇, and the bibasic and the tribasic arseniates, of which the constitution is the same as that of the corresponding phosphates.

The arseniates may be decomposed by being heated to redness with charcoal, which disengages metallic arsenic.
The arsenic acid resembles the phosphoric acid in its atomic constitution, and forms an isomorphous group of salts. The two groups are particularly interesting, as showing the influence which a similar atomic constitution exercises, not only over the form of crystallization, but over the chemical affinities and properties of bodies. Thus arsenic acid, like phosphoric, has a strong tendency to combine with three atoms of soda, forming a tri-arseniate, and this salt readily passes into one, with two atoms of soda and one of basic water, or into one with one atom of soda and two of basic water, corresponding in properties with the analogous phosphates. It also forms tri-arseniates, di-arseniates, and arseniates, with other of the metallic bases.

439. The Salts of Chrome.—The neutral chromates of the protoxides are isomorphous with the corresponding sulphates, their atomic constitution being the same, MO, CrO₄.

The neutral chromate of potassa is of a yellow, and the bichromate of a ruby-red colour. The chromate of lead is an insoluble powder, of a brilliant yellow colour, and is much used as a pigment. The dichromate of lead is red, and the chromate of silver of a rich purple colour.

440. The Salts of Boron.—Owing to the feebleness of its chemical energies, boric acid is separated from all its compounds by most of the other acids, and yet, owing to its being fixed in a temperature in which most of the other acids are volatile, it will decompose even the sulphates at a red heat.

The biborate of soda is known in commerce by the name of borax, and is found native in certain parts of India; it is also prepared from the native boric acid of Tuscany. It turns vegetable blues green, and is used in the arts as a flux for promoting the fusion of the metals.

441. The Salts of Silicon.—The silicates are extensively distributed in the mineral kingdom, some

from page 89
Phosphoric P₂O₅

Chromate of Potash - yellow - Bichromate red

- Of lead is chrome yellow - insoluble
  Dichromate of lead is red lead one of bibina
  Chromate of silver - rich purple.

- Old under name Trical
Under the various forms of Quartz
Rock crystal, Amethyst, Chalcedony
Agate, Carneelian, Jasper, Stone,
Flint, Jasper or Egyptian Pebble.
SALTS OF SILICON.

of them being the most abundant, and others the most beautiful of minerals. The double silicates especially, form a group of much interest to the mineralogist, from the light which they throw on the laws of isomorphism.

442. The silicates of potassa and soda are the bases of the different varieties of glass. Silicic acid combines with the alkalies in various proportions, and when a great excess of alkali is present, the compound is soluble in water. A mixture of 70 parts of carbonate of potassa, 54 of dry carbonate of soda, and 152 of fine quartz sand, forms a very soluble and fusible glass.

443. The different kinds of glass can scarcely be regarded as definite chemical compounds, so much as intimate mechanical mixtures of various silicates. When glass is kept in a soft state for a considerable time, the silicates gradually separate, the mass becomes opaque, almost infusible, and so hard, as to strike fire with steel. In this state it is called Reaumur's Porcelain.

444. The hard white glass made in Bohemia, which is so valuable to the chemist, consists of 70 per cent. of silica, 15 to 18.3 of potassa and soda, and 10 of lime; the English plate or crown glass contains 63 of silica, 22 of potassa, and 15 of lime; the green bottle glass of the French contains from 53 to 60 of silica, 3 to 5 of potassa, 21 to 30 of lime, and 15 to 12 of alumina and iron. English plate glass contains 52 to 60 of silica, 14 to 9 of potassa, and 33 to 28 of oxide of lead. The celebrated optical glass of Guinand yields 42.5 of silica, 11.7 of potassa, and 43.5 of oxide of lead. The oxide of lead greatly increases the refractive power, brilliancy, and fusibility of the glass. In order to deprive glass of the extreme brittleness which characterizes it when rapidly cooled, it is kept for many days in an oven, a part of which is very gradually lessened. This process is called annealing.
445. The various kinds of porcelain and earthenware are the silicates of alumina. The basis of them all is pure clay, which is a neutral silicate of alumina. In order to increase its fusibility, silica, lime, and potassa, are added, without which the clay would have so little coherence, and would contract so much in baking, as to destroy its value and beauty. The iron-stone china is formed of 40 parts of pure clay, 40 of feldspar, 5 of flint glass, and 10 of fine sand.

The various kinds of glass and porcelain are coloured by means of the metallic oxides, which fuse into highly coloured, transparent glasses with silica. Glass and porcelain are coloured blue by cobalt, green by chrome, copper, and iron; yellow by iron and silver; orange by nickel and silver; red by copper, crimson by gold, and purple by manganese.

Section IV.

THE SULPHUR SALTS.

446. These salts are the double sulphurets, as the oxygen salts are the double oxides. The resemblance of the two classes is perfect. The principal sulphur bases are the protosulphurets of the bases of the alkalies, alkaline earths, and earths; and the principal sulphur acids, the sulphurets of the bases of metallic oxygen acids, and in all these combinations, if the sulphur be replaced by oxygen, the corresponding oxygen acids, bases, and salts will be formed.

The most important of these salts are the sulphhydrates of potassium and sodium. They are crystalline soluble salts, of an acid bitter taste, and are represented by the formula KS, HS, and N\textsubscript{2}S, HS. They form a delicate test of the presence of metallic salts, especially of those of lead, by a luminous dark precipitate which they occasion.
describe colouring glass and painting
and painting on China - also
Enamelled painting on the salts, done
in
Ware is baked or burnt in Sagger
and the pieces separated by Latz.

Webber's Cheshire

that is to say each constituent of the salt
viz. its acid and its base contain oxygen

such as Potassium Sodium Barium Calcium Magnesite.

such as Sulphuret of Arsenic Arsenicous Tin Gold etc.

together with by suitable acid, Bi Sulphuret of Carbon - Sulphuret of Selenium etc.

...
of each family is constructed from that of the sulfuric acid terminated with sulfhuret. Thus the salts which contain persulfhuret of arsenic, or hydrogen sulfhuret as the sulfuric acid are termed arsenio sulfhuret and hydro sulfhurets; and a salt composed of each of these sulfuric acids, with sulfhuret of potassium is termed arsenio sulfhuret of hydro sulfhuret of sulfhuret of potassium. For the sake of brevity, the metal of the base may alone be expressed; it being understood that the positive metal in a sulfuric salt enters as a positsulfhuret into the compound. All the hydro sulfhurets have hydro sulfhuretic acid for their electro ionic ingredient combined with a metal as a base, such as hydro sulfhuret of potassium, sodium, barium, &c.

The carbio sulfhurets have bi sulfhuret of carbon for their acid, & metals for bases.

The arsenio sulfhurets have one of theob sulfhuret of arsenic for their sulfuric acids, and so of the molybdo sulfhurets, antimonio sulfhurets, &c. to sulfhuret, &c.

These substances are not new discoveries but have been long known as kinds of sulfur compounds, metalloids, &c. the only novelty being their introduction into the family of sulfhuret a place.
they did not formerly occupy, as they were considered as sulphures, without any suspicion of the presence of acidity, and it is the recent discovery of the existence of the acid that has placed them among the salts. As before mentioned, the combination or union of hydrogen gas with sulphur was formerly called sulphuretted hydrogen gas, without any suspicion that it had acid properties. But since it has been discovered that this gas, adding litmus paper, combining with and neutralising alkalies and metallic bases, it has been admitted into the catalogue of acids under the name of hydro sulphuric acid, and more recently that of sulpho-hydric acid being H.S.
Queen by Wellington.

Elecruus may pervade all space & yet be invisible

It may be a compound of itself of light

of heat and of magnetism.

When it passes thru a non-conducting medium it becomes luminous & have out

light.

When it passes in large quantity with great

intensity thru good conductors longitudinally

it seems of magnetism naturally.

When it passes thru less perfect conductors,

or conductors too small to convey it

it produces heat.

It may seem incandescible because of all

space is full of it as fluid or other

material will adhere to have weight

When incandesced in itself or it own kind.