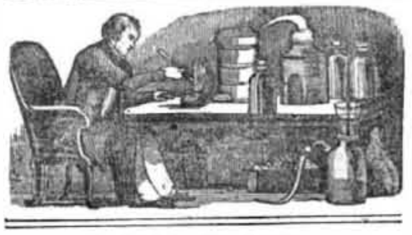


For the Scientific American.

New Chemical Law.

No. 8.

It is evident to any one, that if we attempt to classify the elements, by the extension of this law, we must proceed in the same manner that we would to obtain the substances composing an aggregated series in any of the actual examples which we have previously given, admitting that we did not know their composition by analysis, that is, we must arrange into separate classes all substances possessing similar chemical properties, whether they be compounds or not, and then examine the classes, and we will find that they are either aggregated series or their compounds with other substances. In the examples previously given, it may be seen that we have proceeded from the composition of a substance to its chemical properties. Now in order to show the composition of the elements we must proceed exactly the reverse from this, that is, from the properties of substances to their composition. The first thing therefore in order to find the composition of the elements, is to arrange them into classes by the similarity of their chemical properties, and then to take the classes thus arranged and ascertain if their compounds with other substances also possess similar chemical properties. If they do, then the class is complete; but if they do not, then these substances which form the dissimilar compounds must be rejected. After the classes are arranged by this method, we must arrange them in the order of their atomic weights. Their specific gravities, boiling points and all the numerous other conditions required by the law, should then appear in order.

In casting a glance over the list of elementary substances, there are perhaps none whose similarity of chemical properties are more apparent than chlorine, bromine and iodine, which is a fact that no chemist whatever will dispute. In fact there are no substances belonging to the list of elements which possess a closer similarity than these. They must therefore according to the conditions of the law, belong to an aggregated series. Upon examining their oxygen acids, however, another substance will be found belonging to the same series, which is nitrogen; this must evidently belong to the same aggregated series, as every chemist is well aware of the close similarity of chemical properties between the nitric, chloric, bromic and iodic acids. Oxygen in its manner of combination, closely resembles chlorine, bromine and iodine but upon the examination of their similar compounds the similarity is not perfect; but it strongly resembles their hydrogen acids in its combinations. By this method of proceeding we obtain for an aggregated series. the following substances, viz. nitrogen, chlorine, bromine and iodine. If we arrange them therefore in the order of their atomic weights we shall obtain the order of the series. The following example shows them arranged after this order, and also gives their specific gravities, &c. showing that they actually conform to the condition of an aggregated series.

	At. w't.	Sp. G.	B. Pt.	Sp. G. Vap.	
Nitrogen	14.12			.976	gas.
Chlorine	35.42	1.33		2.470	gas.
Bromine	78.40	2.97	116°	5.393	fluid.
Iodine	126.60	4.94	347°	8.707	solid.

What a perfect example of an aggregated series is the one above given! agreeing in every particular with the numerous conditions required by the law. The specific gravities, boiling points, and the specific gravities of their vapors are in a regular increase. By calculation it may be seen that the specific gravities of their vapors are directly proportional to their atomic weights. They also increase in density, the first two being gases; the third a fluid, and the fourth a solid, which is according to the requirements of the law; and all this complete classification derived merely by the similarity of their chemical properties. We know, therefore, that they must all be derived from the aggregation of one radical. By comparing the atomic weights with each other, a simple ratio is found to exist between them; thus the ratio between nitrogen and chlorine is, as 2 is to 5; between nitrogen and bromine as 2 to 11; and between nitrogen and iodine as 1 to 9; by taking therefore the atomic weight of the radical 7.00, we will have the following close agreement between the atomic weights of these substances, the one column calculated by this law, and the others by actual experiment.

	By Calculation.	By Experiment. Kane.	By Experiment. Turner.
Nitrogen	7×2 = 14 00	14.00	14.15
Chlorine	7×5 = 35 00	35.47	35.42
Bromine	7×11 = 77.00	78.39	78.40
Iodine	7×18 = 126.00	126.60	126.30

Thus by proceeding with the elements in exactly an opposite method to the manner of illustrating a series of known composition, we arrive at these results. Thus in organic chemistry we form a series by their analytical composition and which consists of substances possessing properties; but with the elements we infer their composition by a knowledge of the chemical properties which an aggregated series should possess. S. N.

Bridgeport, Conn.

Art of Lackering.

We have seen many receipts for making lackers but the two following are the cheapest and answer all the purposes necessary for brass goods; particularly as they can be used when necessary along with any of the colouring liquids, directions for making which we shall also give. We shall first give a receipt for making.

COMMON LACKER FOR BRASS.

And in order to prepare this properly, it is necessary to select the best seed lac which can be procured, which must be washed in water and then dried and beat in a mortar to a coarse powder. Dissolve six ounces of this powder in two English pints of spirit of wine. They must be both put into a tin or glass bottle, which will hold nearly double the quantity meant to be prepared. Shake the bottle well, and then place it in a warm situation, near a fire or stove, which will hasten the solution. Shake the mixture occasionly, say every three or four hours, for the first and second day; allow it to stand still for twenty-four hours more, when the insoluble portion of the lac will have fallen to the bottom, then gently pour off the pure part into a clean bottle, and it is fit for use. This lacker will answer for all kinds of common brass work, tin plate, block tin, &c. It has a redish yellow colour, which may be heightened at pleasure by laying on two or more coatings. Its colour may likewise be easily varied by the use of the colouring solution to be afterwards described. When this lacker is used as a varnish to bronzed work it gives it a brownish coloured ground. The only other lacker we mean to describe, is a

FINE PALE LACKER,

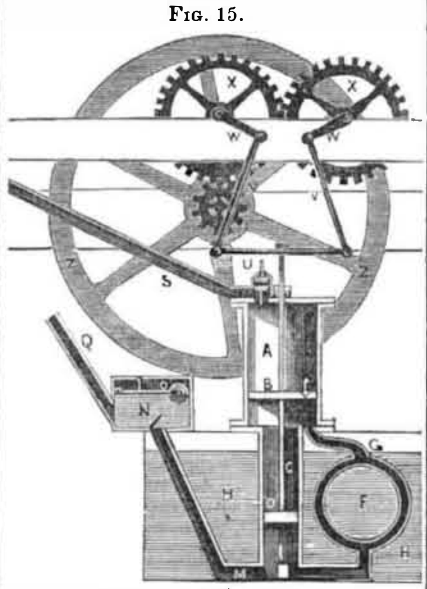
which is prepared with shell lac, instead of seed lac, and with highly rectified spirit of wine. The most transparent part of the shell lac must be selected, and it must be washed in clean water. It is then allowed to dry, and afterwards pounded into a coarse powder. Of which let ten ounces be taken and mixed with two English pints of highly concentrated spirit of wine or alcohol. The mixture is put into a glass bottle, capable of holding as in the former case. about twice the quantity wished to be made. The bottle must then be stopped up, and placed in a warm situation, and shaken, as in the former instance. When the solution is completed the clear part is to be gently poured off, and the remainder filtered through a sheet of strong blotting paper. This must then be added to the portion first poured off, and the residium which remains in the paper is then to be thrown away.

Both lackers must be preserved in a close bottle; and if properly made, and kept from the air, either of them will keep for years, and still be as good as ever. The last described lacker, when used without colouring, is scarcely seen upon varnish or dipped brass, but it will preserve it for many years, and prevent it tarnishing.

History of the Rotary Engine.

Prepared expressly for the Scientific American.

Fig. 15.



CARTWRIGHT'S ENGINE.

This is a most ingenious engine invented by the Rev. E. Cartwright, in 1797. His object was to procure a tight piston and a condenser in which the steam was exposed to a large surface of water.

The condensation is effected by two metal cylinders, placed one within the other, and having cold water flowing through the inner one, and enclosing the other one, and thus the steam is exposed to the greatest possible surface in a thin sheet. Mr. Cartwright likewise has a valve in the piston, by which a constant communication is kept up between the cylinder and condenser, on either side of the piston, so that the condensation is always taking place, whether in the ascending or descending stroke. By this contrivance, steam that may escape past the piston will be immediately condensed, and the vacuum thereby preserved. This was considered to be a decided advantage over the general mode of arranging the valves, which does not always provide for the restoration of a vacuum destroyed by the imperfection of the packing.

"The piston B moving in the cylinder A, has its rod prolonged downwards; another piston D is attached to it, moving in the cylinder B, and which may be also considered as a prolongation of the steam cylinder. The steam cylinder is attached by the pipe G to the condenser by coming in contact with the cold side of the condensing vessel. The water of condensation falls into the pipe E. To the bottom of the cylinder I, a pipe M is carried into a box N having a float-ball O, which opens and shuts the valve P, communicating with the atmosphere: a pipe Q is also fitted to the box. There is a valve placed at I, opening into the cylinder C; another at N, also opening, upwards. The pipe S conveys steam from the boiler into the cylinder, which may be shut by the fall clack R. K is a valve made in the piston B.

"In the figure the piston B is shewn as descending by the elasticity of the steam flowing from the boiler through S: the piston D being attached to the same rod is also descending. When the piston B reaches the bottom of the cylinder A; the tail or spindle of the valve K being pressed upwards, opens the valve, and forms a communication between the upper side of the piston and the condenser; at the same moment the valve R is pressed into its seat by the descent of the cross arm on the piston, which prevents the further admission of steam from the boiler; this allows the piston to be drawn up to the top of the eylinder, by the momentum of the fly-wheel Z, in the non-resisting medium. The piston D is also drawn up to the top of C, and the valve I is raised by the condensed water and the air which have accumulated in E, and in the condenser G. At the moment when the piston has reached the top of the cylinder, the valve K is pressed into its place by the pin or tail striking the cylinder or cover; and at the same time the piston B striking the tail of the valve R, opens it; a communication is again established between the boiler and the piston, and it is forced to the bottom as before. By the descent of the piston D the water and air which were under it in the cylinder C, being prevented from returning into the condensed cylinder by the valve under I, are driven up by the pipe M, in the box N, and are conveyed into the boiler again through the pipe Q. The air rises above the water in A; and, when by its accumulation its pressure is increased, it presses the float O downwards; this opens the valve P, and allows it to escape into the atmosphere."

This machine exhibits much ingenuity and it gave considerable satisfaction when it was tried at Horsleydown, England, but the mode of condensation is not half so good as in the common way of bringing the steam in direct contact with cold water.

Gold in Canada.

Professor B. Silliman, Jr. has published a brief account of his examinations of masses of gold found in the Valley of the Chaudiere, Canada. The lumps are worn smooth, as is usual in alluvial gold, but fragments of quartzose gangue could still be detected in some of them. They were firmly imbedded in what appeared to be slate, but which is probably a concrete of detritus cemented by oxide of iron. Chromic iron, titaniferous iron, serpentine, spinel, rutile, and talcose rocks remind us very strongly of the mineralogical characters of the Russian gold regions, and their occurrence with the gold in Canada certainly affords favorable grounds for the hope that this may become a rich auriferous region. A few tons of gravel has been washed in a rude way with the Berks rocker, which have yielded about $4 of gold to the ton of gravel.

Cholera.

For the cholera and cramp in the stomach, take a piece of saleratus about the size of a large hazelnut, moisten it a little with water, pour upon it a wine glass full of the best vinegar, and drink it while in a state of effervescence. This simple draught it is said cured many violent cases of cholera during its last visit to this country, and recommends itself as being within the reach of all.