

tube was nearly in contact with the metallic heap. The pipe was made to form an air-tight juncture where it entered the tubulure, and the beak of the retort was recurved so as to be beneath the surface of some water in a wine-glass. The bell being depressed below the surface of the water in the pneumatic cistern, the cock was opened so as to allow the gaseous mixture to enter the retort and displace the atmospheric air. As soon as this was known to have taken place, by the disappearance of the red fumes, resulting from the reaction of the nitric oxide and atmospheric oxygen, the gas being still allowed to pass slowly in bubbles through the water in the wine glass, an incandescent coal was held near the part of the retort supporting the sponge. The metal being thus heated became ignited, and fumes appeared in the cavity of the retort. An absorption of the water in the wine glass followed, which was however immediately checked by a supply of gas from the bell sufficient to cause the bubbling to recommence and continue. Under these circumstances the water in the wine glass acquired the odour of ammonia, and gave with copper the well known blue colour.

In a subsequent experiment a small lump of the sponge was secured in a coil of platina wire and fastened to the tube so as to receive the jet of the mixed gases.

Dr. Hare published the fact, some years since, that asbestos soaked in a solution of chloride of platinum and ignited, would cause the inflammation of hydrogen with oxygen. He finds asbestos, similarly prepared, to produce the synthesis of ammonia, either when substituted for the sponge, in the experiment above described, or carried red hot from a fire and passed into a bell glass containing the mixture over mercury.

In fact a piece of charcoal soaked in a solution of chloride of platinum, (chloroplatinic acid,) produced effects analogous to the platinated asbestos.

To produce platinated asbestos, it was found sufficient to dip it in liquid chloride of platinum, and then subject the mass to a red heat in a common fire.

Rotary Multiplier, by R. HARE, M. D.

Dr. Hare has contrived a Rotary Multiplier in the following way:

Just as the needle, in oscillating, reaches its appropriate position in the meridian, by means of two pins proceeding from it perpendicularly so as to enter two mercurial globules, it completes a circuit through the coil; one end of which terminates in one of the globules. The other end of the coil of the multiplier communicates with one pole of a galvanic pair, of which the other pole communicates with the other globule. The needle is thus subjected to an impulse which causes it to revolve until it receives another impulse by the same process repeated. Each revolution therefore causes an impulse which is productive of a succeeding revolution so long as the galvanic reaction is sustained.

The construction was subsequently improved by employing two coils of copper wire of equal length, separated by paper, and varnish, one being wound over the other. They were so arranged that the needle receives two impulses in each revolution, one as above described, the other when its north pole points to the south. Again two needles associated so as to form a cross are made to complete a circuit every fourth of a revolution, and thus to receive four impulses in one revolution. The completion of the circuit is effected by pins of copper, which descend vertically from the needle and enter globules of mercury, communicating generally with the ends of the

coils and the poles of a galvanic pair duly excited. The instruments were exhibited in operation by Dr. Hare, at the Conversation Meeting of the Franklin Institute, in April.

It has been ascertained by the same chemist that a permanent self-regulating reservoir of chlorine may be made by means of the apparatus heretofore used by him for nitric oxide, substituting for the materials, in that case used, manganese in lumps and concentrated muriatic acid.

In one case Dr. Hare doubting the nature of the gas, in order to test it, exposed some leaves of thin metal, called Dutch gold leaf, to a jet of the gas. To his astonishment the whole apparatus exploded violently as if one of the explosive compounds of chlorine and oxygen had been generated.

This result is quite inexplicable to Dr. Hare, especially as the paleness of the hue led him to doubt the purity of the gas. The oxides of chlorine are well known to be deeper in colour than their radical, when isolated.

Experiments on Solar Light. By JOHN W. DRAPER, M. D. Professor of Chemistry, Hampden Sidney College, Va.

1, *Action of absorbent media.* 6, *absorption of the different rays of light and distorted spectra.* 16, *absorption of radiant heat, instrumental arrangement for measuring.* 24, *action of vapour of iodine and nitrous acid.* 28, *absorption of chemical rays.* 29, *bodies nearly opaque to them.* 33, *thermal disturbance of gaseous mixture, and penetration of their dimensions.* 38, *decomposition of carbonic acid by the Sun's light.* 39, *by radiant heat.* 40 *power of capillary action exalted by heat.*

1. The effect of absorbent media upon the colorific rays of light, has been, as was predicted by an eminent writer on Optics, of singular service in developing new views of this subtle agent, and giving us a more precise knowledge of the complex constitution of the Solar beam. Hitherto, the action of these media, upon the calorific and chemical rays, has not been thoroughly investigated, nor are there, so far as I know, any experiments on record, exhibiting this matter in its full importance.

2. We have been accustomed to regard the chemical properties of the Solar ray spectrum, as due to the violet ray,—as something coherent to it. A similar opinion was formerly maintained, respecting the calorific constitution of the red ray. The position to which we are brought by advanced investigation, has long ago established the separate existence of heat making rays, and the experiments here communicated give much weight to the doctrine, that the chemical rays have also a separate existence. It is true it cannot yet be proved, though analogy and probability are favourable to the idea, that there are sub-divisions both of the chemical and calorific rays, similar to those of which our senses give evidence in the colorific ray, each of which is endued with distinct powers of its own.

3. How complex and compounded is the constitution of the solar beam; a ray of heat, composed perhaps of three or more rays of different refrangibility; a ray of light, composed of three simpler rays; a ray endued with chemical energy, and of a similar composition to the former, as analogy would lead us to suspect. Again, each of these elementary rays is composed of particles, one-half of which have their planes of polarization at right angles to the other. All these elements taken together, constitute a beam of the same light. Emanations from the sun, alter they have undergone the absorptive action of the atmosphere of that great luminary, and of that