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REPORT ON THE HEAT OF COMBINTIONS—BY DR. ANDREWS.

Every molecular change in the condition of matter is almost invariably connected with the evolution or the absorption of heat; and the quantity of heat thus set free, or absorbed, bears always a definite relation to the amount of the mechanical or chemical action. To ascertain this relation has been the object of Dr. Andrews in this investigation. The report gives a general view of the actual state of our knowledge on the subject of thermochemistry. We cannot condense within the limits of our journal the numerous points of interest in this Report. They are of the highest scientific interest,—and will be published entire in the Journal of the Association. The following are a few of the principal points :—

1.—The solution of a salt in water is always accompanied by an absorption of heat. 2. If equal weights of the same salt be dissolved in succession in the same liquid, the heat absorbed will be less on each new addition of salt. 3. The heat absorbed by the solution of salt in water holding other salts dissolved is generally less than that absorbed by its solution in water. 4. The heat absorbed by the solution of a salt in the dilute mineral acids is generally greater than that absorbed by its solution in water.—It was further shown by Dr. Andrews that in reference to the combination of acids and bases, the heat developed during the union is determined by the base, and not by the acid. An equivalent of the same base combined with different acids produces nearly the same quantity of heat. When a neutral salt is converted into an acid salt by combining with one or more equivalents of acid, no disengagement of heat occurs. When a double salt is formed by the union of two neutral salts, no disengagement of heat occurs. When a neutral salt is converted into a basic salt, the combination is accompanied by the disengagement of heat. When solutions of two neutral salts are mixed, and a precipitate formed from their mutual decomposition, there is always a disengagement of heat, which although not considerable, is perfectly definite in amount. Numerous results illustrative of this point were given.

The combinations of metals with acids, and their combustion in oxygen, were then examined. The actions of chlorine, iodine, and bromine were also detailed, and the heat developed by the combination of these bodies with metals shown.

Prof. Magnus asked if Dr. Andrews had noticed any difference in the heat of combination of bodies in different allotropicstates—as, for instance, the diamond, graphite and carbon. Dr. Andrews stated, that the diamond disengaged 7824 units of heat during its combustion in oxygen gas, in the form of graphite, 7778 units—and in that of wood charcoal, 8080. It has also been thought that differences had been observed in the heat disengaged in various allotropic states.

ON THE PRESENCE OF NITROGEN IN MINERAL WATERS.—BY MR. B. WEST.

This communication was directed to the correction of an error which has prevailed as to the absence of nitrogen in the mineral waters of the Continent, and its constant presence in those of England. After quoting Dr. Granville's "Spas of England," in which this statement is boldly made, the author shows from the analysis of Sigwart and Weiss that nitrogen is found in the waters of Wilbold and Liebenzell. Dr. Heyfelder mentions the Crow Bath near Alpersbach, analyzed by Sigwart, which contains five inches of nitrogen per English gallon. It has also been found at Wilkelmstift, at Tubingen, at the Wildbad near Giengen, and a great many of the spas of Germany. Indeed, it appeared that all the thermal springs, the air of which had been examined, gave evidence of the presence of nitrogen in combination with carbonic acid.

Professor Forchammer stated that nitrogen had been detected in the springs of Iceland, not dissolved in the water, but escaping with the air bubbling up through it.—Dr. Daubeny believed that nitrogen was a constant product of thermal springs. Professor Rogers, of Philadelphia, said that in an extensive examination of the thermale springs of the United States, nitrogen gas was found in every instance; and that also in the sulphurous springs the chalybeat springs, and in the alkaline springs nitrogen is always found, and all the results obtained by American chemists completely confirmed those given by Brithish chemists.—Dr. Miller examined the air which had got into the upper portion of the water barometer of the royal Society and found it pure nitrogen.—Dr. Clanny and other gentlemen spoke to the same point:—all the evidence confirming the statement that nitrogen was a constituent of the air of thermal and other springs.

For the Scientific American.

Important Discovery that may Lead to Improvements of Great Value.

On a certain day last winter, at the request of one of the most noted political writers of modern times, a brief explanation was sent by letter of an important discovery in science, to one of the most scientific men of the world, in order to obtain his opinion of its correctness or value. After looking at the rough sketch of an explanation that was submitted to him, he began his reply as follows :

"Dear Sir—Your communication of the 12th came to hand on the 16th inst. I do not feel competent to express any definite opinion on your ingenious hypotheses of the curve of least resistance; of the philosophy of its deductions from planetary motions, and its application to ship building. If the rule you have discovered prove the true one, its verification is of vast importance. Then why not bring it to the touchstone of experience at once? A small cost will enable you," &c.

But I have quoted enough to excite more or less the curiosity of every scientific reader, and that is my object in quoting at all. I wish to induce them to examine carefully the reasoning on which that discovery is based.

All mankind, as individuals, as societies, and as nations, are liable to error, and one error will often lead to numberless others.—Even the most learned and scientific men may, age after age, overlook a single important fact, and thereby be led astray in possibly a thousand different ways. The instance of this kind, which we shall now explain, we believe to be of great importance, and one that is the more remarkable, because it is among the "exact sciences," and of every day observation throughout the world. We do not mean that the men alluded to have wholly erred in regard to this question; but simply that they have not understood it fully. Still that small want of thorough understanding has retarded the onward march of improvement more than it would now be possible to estimate; for if our idea be right, the speed on the ocean would have been far greater, and therefore steam would have been used on the ocean long before it was—as it would have then been quite plain that a sufficiency of fuel could be carried for that purpose. It is well known that that important step in human progress was kept back, and all the consequences resulting from it, by a doubt on that point,—a doubt which could not have existed if the speed of vessels had been even one half greater than it then was; and if we are right in all our calculations on this subject, the speed of ocean steamers would have been vastly greater had it not been for that error or oversight of the present world. The error consists, we believe, in not fully or correctly understanding one of the most important principles in matter. It is that principle which the carpenter makes use of to force a nail into wood, and which the farmer takes advantage of to force apart the firm and solid timber. The blacksmith uses it in compelling the particles of red hot iron to arrange themselves in accordance with his wishes. It is that principle or power that demolishes walls when cannon balls are thrown against them. It is that principle or power that carries a ball aloft to the clouds, in spite of the resistance from the air and attraction combined, when it is thrown upwards from a gun.

In all these cases we think science gives it the name of momentum. It is that principle which causes boatmen on the canal to use stout bow lines and snubbing posts: boatmen we think, give the name of headway. It is that principle which causes the water to flow out of the arm of Barker's water wheel more rapidly when the wheel is in revolving motion than when it is at rest. It is that principle which keeps the string firmly extended when we are endeavoring to throw a stone with a sling. It is that principle which is continually exerting such enormous power, as to keep the planets from falling into the sun. In these last three examples science calls it centrifugal force. Philosophers write and speak of centrifugal force as if they considered it a distinct principle in matter, about which they would have known nothing if they had never seen circular motion. Whereas, if they had fully understood the principle we speak of, they would have been able to estimate, with the utmost exactness, all its power, even if circular motion had never been seen or known by them. They could have estimated the exact amount of centrifugal force and its rate of increase even if they had never seen or heard of circular motion. In speaking of this principle under the term "central forces," Nicholson's Encyclopedia explains it by nine propositions.—We will give the first as a specimen :

"1. When two or more bodies revolve at equal distances from the centre of the circle they describe, but with unequal velocities, the central forces necessary to retain them will be to each other as the squares of their velocities. That is, if one revolves twice as fast as the other, it will require four times the retaining force the other does; if with three times the velocity it will require nine times the force to retain it in its orb," &c.

If, instead of all those propositions, of which the foregoing is the first,—if instead of all they have said on motion and on central fortes, they had simply told us that matter resists a change of state, whether of rest or of motion, and that the amount of resistance is in proportion to the amount of change; we might have learned far more from it than from all the lengthy explanation the Encyclopedia gives. That single proposition is capable of solving all that they have given, and farmore besides. Let us apply it to the one we have quoted. Suppose a ball placed on a horizontal revolving plain, one hundred inches from its centre, and that the plain revolves from the west, in the direction, north, east, south, &c. When the ball arrives at a point exactly north of the centre, its motion is exactly east, and if let alone it would of course keep going directly east; but being compelled to move in a circle from whatever cause, whether a string or attraction, it will, after passing in its orbit about fourteen inches, have left that straight line one inch,—or in other words it would be moved by the central force one inch from where it would have been, if let alone. But if its velocity were double, it would in the same time have travelled about twenty-eight inches in its orbit, and of course have left that straight line four inches instead of one; or in other words would be compelled to be by the central force four inches from where it would have been if let alone, which is four times as far as when going in the orbit with half that velocity; and to move any resisting substance four times as far, must require four times the force—so says reason, as well as our proposition, so that we arrive at the same conclusion they do, by a rule which, although much shorter than either one of their propositions, will not only solve all of them, but far more besides. For example, if we apply that central force, or its equivalent, to urge the ball onward, on the straight line, instead of drawing it towards a centre, it would in the same time, instead of having left that straight line by one inch, be one inch farther east on the same line it was travelling, than it would have been if let alone. So also, if the same force were drawing it west, it would in the same time have so far retarded its motion, as to leave it one inch farther west than it would have been if let alone; and if the force were four times as great, it would leave it four times as far in the same time from where it would have been. That a body would take these various positions by applying the force in the various ways mentioned, are important truths that are not learned from either one of all the nine propositions alluded to in the Encyclopedia; and yet it is an evident and natural deduction, from the proposition or rule that we have given, and does away with the mystery that has seemed connected with circular motion.

(To be Continued.)

Experiments in Steam, and Professor Horsford.

MESSRS EDITORS:—It has been of frequent remark that Oxford and Cambridge must of necessity be very wise places, seeing so much wisdom enters and so little leaves them. By the same rule, the following statement will show that Harvard University must be a wise place also.

Half a century ago Gay Lussac and Dr Dalton experimentally found that a column of air, or any gas, must be heated 480° to double its volume, and very strangely inferred that all vapor and steam followed the same law of rarifaction by heat. This unfortunate mistake has been deferentially adopted in all chemical works and treatises on the steam engine, however generally correct and talented the authors.

The writer of this article having been long and earnestly engaged in discovering the mysterious cause of the explosion of steam boilers, happily discovered that steam heated apart from water, was doubled in volume by four degrees of heat—trebled by sixteen degrees of heat, and farther greatly increased in volume by additional and trivial quantities of heat; and he farther found that steam so heated is transformed into a new and far more economical element of power, which he terms stame; so chemically and mechanically distinct from steam, that the application of fuel for the production of motive force, is thus easily susceptible of immense and unexpected economy, the details of which, having been published in a pamphlet, including diagrams of all necessary and easily constructed instruments for demonstrating the accuracy and intrinsic value of this discovery, which, in extent of usefulness and economy, will be found equal in importance to any discovery of the age.

Count Rumford having left a sum of money to Harvard University—directing the interest thereof to be distributed to any discoverer of any new and useful properties of heat. The writer submitted his pamphlet to the Harvard University, claiming some honorary reward for his great discovery. The University referred the pamphlet and claim to the very learned Rumford Professor and assisting Rumford Committee, who, after a profound contemplation of more than half a year, reported that Gay Lussac was right—the indications of his instrument correct, and the writer's statement that steam was doubled by four degrees of heat, and trebled by sixteen, was ninety times too great, and all this without condescending to try the instrument of the writer.

The Report of Prof. Horsford was published in the Scientific American, page 24, this volume. It merely denies the correctness of the discoveries of the subscriber, but does not detail the experiments, which have been witnessed by the most eminent engineers and learned men in the city of New York, and recently by the Editor of the Scientific American. The subscriber hereby invites the Rumford Professor and Committee to a public comparison of Gay Lussac's instrument, with the simple, unobjectionable and accurate instrument detailed in the writer's pamphlet, at a public exhibition, to be shortly held in New York, for the double purpose of publicly proving the stubborn facts therein stated, and for describing several other important and as wonderful facts, lately discovered—showing that this new element, Stame, will produce motive force so much more economically and abundantly than steam, that the latter element, like the Professor's statement, will be found both pitiful and contemptible. JAMES FROST.

Brooklyn, N. Y., Nov. 1, 1849.

Patronage.

The Sciences, after a thousand indignities, retired from the place of Patronage, and having long wandered over the world in grief and distress, were led at last to the cottage of Independence, the daughter of Fortitude, where they were taught by Prudence and Parsimony to support themselves in dignity and quiet.