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bite, thinking it possible that it also might contain titanium; but it gave no indication of that metal, either when fused in the reducing flame, with salt of phosphorus alone, or with the addition of a small morsel of tin-foil.

3. *The Matrix, or greyish-coloured substance, in which the latrobite is imbedded.*

Alone in the matrass, behaves like latrobite; appearance unaltered.

In forceps, bubbles up, and fuses into an irregular greyish globule.

With soda, in proper proportion to the assay, fuses into a greenish-grey, semi-transparent globule, which in the reducing flame is colourless. On platina foil, with soda and nitre, very slight indication of manganese.

With borax, dissolves very slowly; globule transparent, and deep-yellow, hot; colourless, cold; in the reducing flame nearly the same, but colour lighter, and more inclining to green.

With salt of phosphorus, nearly as with borax, except that the action is still slower, the yellow colour, in either flame, lighter, and without any tinge of green. A silica skeleton remains undissolved.

With nitrate of cobalt, dirty-rose colour; the fused edges purple.

From the last result, the grey substance appears to contain a considerable portion of magnesia.

I hope before long to give the analysis of the three preceding minerals.

Article VII.

Abstract of the Report on M. Rousseau's Memoir respecting a new Method of measuring the Power of Bodies to conduct Electricity. By MM. Ampere and Dulong.*

M. Rousseau, who has been occupied several years in the construction of dry voltaic piles, with the view to discover the circumstances which modify the energy and duration of their action, conceived the idea of employing those instruments to appreciate the different degrees of conducting power of the substances arranged in the class of bad conductors of electricity. For this purpose he has contrived the apparatus we are about to describe. The dry pile, which forms the principal part of it, is made of discs of zinc and tinsel, separated by pieces of parchment, soaked in a mixture of equal parts of oil of poppies, and essence of turpentine; the whole is covered laterally with resin to prevent the contact of the air. The base of the pile

* From the Annales de Chimie.

communicates with the ground. Its upper extremity may be connected by a metallic wire with an insulated vertical pivot, carrying a weakly magnetic needle, balanced horizontally. On a level with the needle, and distant from the pivot, about half the length of the latter, is a metallic ball, also insulated, but communicating with the pile. It is evident that by this arrangement, the electricity accumulated at the upper pole of the pile, is communicated to the needle and the ball, and consequently repulsion ensues, tending to separate the needle, which is moveable, from the ball which is stationary. If we place the pivot and the ball in the magnetic meridian, the needle touches it, and remains at rest as long as the apparatus is not connected with the pile; but the instant the communication is established between them, the needle is repelled, and after some oscillations takes its position of equilibrium, depending on its magnetic power and the energy of the pile. These two quantities remain constant for a considerable time, with the same apparatus, as may be ascertained, by determining the angle which the needle makes with the magnetic meridian, after it has assumed a fixed position, by means of a divided circle adapted to the cage which covers it. A simple conducting needle suspended by a metallic wire of proper diameter and length, might be substituted for the magnetic one; but M. Rousseau's apparatus is much more convenient, and sufficiently sensible for the kind of effect which it is his object to measure.

To use it for ascertaining different degrees of conducting power, it is sufficient to place the substance submitted to experiment in the electrical current, taking care that the thickness which the electricity has to pass through be always equal. If the flow of the quantity of electricity necessary to produce the greatest deviation be not instantaneous, the time required by the needle to assume its fixed position, may be taken as the measure of the degree of the conducting power of the substance employed.

To submit liquids to this kind of examination, M. Rousseau places them in small metallic cups, communicating by their foot with the needle and the ball: he then places in the liquid one of the extremities of the metallic wire, covered with gum lac, that the same surface of metal may always be in contact with the fluid, and measures the duration of the needle's motion from the moment when the communication is established with the pile by the other extremity of the wire.

By submitting the fixed vegetable oils employed in the arts and in domestic economy to this kind of proof, M. Rousseau has established a very singular fact, which may be useful in commerce; it is that olive oil possesses a very inferior degree of conducting power to that of all the other vegetable or animal oils, which nevertheless present, in all their physical proper-

ties, the strongest analogies to that substance. For instance, every thing being equal in both cases, olive oil required forty minutes to produce a certain deviation, while poppy oil, or the oil of the beech-mast, required only twenty-seven seconds to produce the same deviation. One-hundredth part of any other oil added to oil of olives reduces the time to ten minutes. It would, therefore, be easy to discover by means of this instrument the smallest traces of any oil fraudulently mixed with oil of olives.

If the proportion of the foreign substance be considerable, the difference of time necessary to produce the maximum of effect would no longer be sufficiently great, and could not be measured with sufficient precision to indicate the proportion of the elements; but the apparatus might easily be modified so as to adapt it to this kind of determination.

The solid fats are worse conductors than the animal oils, arising no doubt from the large proportion of stearine contained in the former; for M. Rousseau is satisfied, by comparative trials with stearine and elaine, prepared by M. Chevreul, that the conducting power of the latter much exceeds that of the former. The fat of an animal becomes a worse conductor in proportion to the age of the individual which afforded it.

By means of the same apparatus, we may also observe a notable difference between resin, gum lac, and sulphur, the most insulating of all known substances, and silk, crystal, and common glass.

M. Rousseau has not found any difference in the conducting power of liquids, whether spirituous or aqueous, acid, alkaline or neuter, the time required by the needle to arrive at the maximum of deviation being too short, in every case, to ascertain the inequality of its duration. But a modification of the apparatus, similar to that for determining the proportions in an oleaginous mixture, would easily appreciate that difference.

It would be equally possible, and very curious, to try the effect of the two kinds of electricity on different substances; all that would be necessary would be to place the two poles alternately in connexion with the ground. According to Ermann's results, it is probable that a difference would be found between some substances.