



## XXV. Chemical examination of the native cinnabars of Japan, Newmarktel, and Idria

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each spring may have one-half less mass than if, being single, its height were double; and in order that, this mass being more equally distributed around the centre of motion, the regulator might not be exposed to gain or lose by lateral shocks. The advantages of this method have been confirmed to me by a number of experiments.

By means of these precautions we may turn the watch rapidly, or make it vibrate quickly on its suspension, without any sensible difference resulting in the arcs of vibrations.

There is but one foreign motion that can derange it; and that is the one which it may receive circularly on the axis of its regulator. But the machine being adapted to the vessel by means of four fastenings, fixed at the bottom of the box, it is impossible that it can receive any thing of the kind.

Moreover, I have thought it best (on the authority of what has been observed by M. l'abbé *Chappe*, and on what has been said by M. *Bouguer*, p. 214 of the *Manœuvre de Vaisseaux*, that *the inclination of a ship is much too great when it is from 18 to 20 degrees*;) to dispose my machine, not for inclinations which rarely take place, but for a mean term. It has therefore the liberty of describing on its suspension, and in its box, only 15 or 16 degrees; this may go as far as 18 or 20 by the giving way of the cushions and pad, if the weight of the watch press them any time.

[To be continued.]

## XXV. Chemical Examination of the native Cinnabars of Japan, Newmarktel, and Idria. By M. KLAPROTH\*.

### I.

THE cinnabar of Japan, which is brought to Europe in crystallized grains, is of a deep cochineal red, inclining to steel gray; and in other places it is of a scarlet red, inclining to brick colour.

There are fragments of flat hexaëdral prisms, outwardly very smooth, of a metallic lustre, inwardly very brilliant, and semi-metallic.

\* From *Annales de Chimie*, tome lviii. p. 303.

The transverse fracture is scaly, the longitudinal one lamellated.

The fragments are irregularly angular and opaque. Pyritous points are partly scattered over them, or rather they adhere to a quartz matrix. The mineral is tender; its powder is of a scarlet colour; its specific gravity is 7.710.

A. 1000 grains were sublimed in a retort furnished with a globular receiver, in which a little water was put. The produce sublimed was exactly similar to artificial cinnabar. The water of the receiver, rendered turbid by some parts of sulphur, contained sulphuretted hydrogen gas and sulphurous acid in small quantity. The residue in the retort, weighing 38 grains, being digested with muriatic acid, the latter took up the iron coming from the pyrites and left the quartz matrix.

B. *a.* 104 grains of mineral, which according to the above experiment contained 100 grains of cinnabar, were heated with 500 grains of muriatic acid, which disengaged from it sulphuretted hydrogen gas. 100 grains of nitric acid were successively added, which produced, with lively effervescence, the decomposition of the cinnabar, and the complete solution of the metallic parts.

*b.* The sulphur remaining, of a grayish yellow, had a viscous consistence; it weighed 11.8 grains. When burnt it left a blackish residue of 1.5 grains, which deducted from the preceding weight determines the quantity of sulphur at 10.3 grains.

*c.* The solution of cinnabar in nitro-muriatic acid was mixed with muriate of barytes. The precipitate, after having been made red hot, presented 30 grains of sulphate of barytes, which correspond with 4.2 grains of sulphur. Besides these 14.5 grains of sulphur, we may count a quarter of a grain of loss by the sulphuretted hydrogen gas; whence it results that 100 parts of pure cinnabar contain 14.75 of sulphur.

C. 1040 grains of cinnabar, which contain, according to the above experiment, 1000 grains of pure cinnabar, were distilled with half the weight of iron filings; the produce

was 845 grains of mercury : thus cinnabar contains, not including the heterogeneous parts,

Mercury	-	-	84.50
Sulphur	-	-	14.75
			<hr/>
			99.25
			<hr/>

## II.

### *Cinnabar of Newmarkt, in Carniola.*

This ore is distinguished by its beauty from every other in Europe. The mineral is of a lively cochineal red. It is found in considerable masses, enveloped with a blackish gray chalk, traversed with veins of calcareous spar of a milky white. Its specific gravity is 8.160.

A. 100 grains were heated to ebullition with 500 grains of muriatic acid; 100 grains of nitric acid were afterwards successively added. After perfect solution there remained 10.20 grains of yellow sulphur, which burned without leaving any residue. Muriate of barytes produced in the solution 27 grains of sulphate of barytes, which correspond to 3.80 of sulphur. If the loss of the sulphur, which formed the sulphuretted hydrogen gas, amounts to a quarter of a grain, the quantity of sulphur in 100 parts of cinnabar ought to be 14.25 grains.

B. 500 grains of cinnabar mixed with half as much iron filings, and distilled, yielded 425 grains of mercury.

100 parts of the cinnabar analysed, therefore, contain :

Mercury	-	-	85
Sulphur	-	-	14.25
			<hr/>
			99.25
			<hr/>

## III.

### *Hepatic Sulphuret of Mercury of Idria.*

A. 1000 grains of cinnabar, distilled with half that quantity of iron filings, yielded 818 grains of pure mercury. The sulphuret of iron remaining was mixed with a black dust.

B. 100 grains were treated with the nitric and muriatic acids,

acids, and precisely the same phænomena were observed as in the preceding analysis of the cinnabar of Japan. Upon the combustion of the sulphur a black residue remained, consisting of three grains of charcoal, which left upon incineration one grain of reddish ashes. The quantity of sulphur obtained was 13·75.

*C. a.* 1000 grains of hepatic sulphuret were distilled in the chemico-pneumatic apparatus: 34 cubic inches of sulphuretted hydrogen gas passed over, without mentioning a part which was dissolved by the water of the receiver. 256 grains of pure cinnabar were sublimed, and the neck of the retort was coated with a mixture of humid ethiops and metallic globules, from which 317 grains of mercury were mechanically separated.

*b.* The residue in the retort was of a charcoal black; it weighed 39 grains. When incinerated it left 16 grains of a grayish powder, which ascertains the charcoal consumed to be 23 grains.

*c.* This earthy residue, treated by the muriatic acid, left  $6\frac{1}{2}$  grains of silix.

*d.* The muriatic solution, of a greenish yellow, was hypersaturated by ammonia, which produced a brownish precipitate: the liquor was of a clear blue.

*e.* The precipitate, treated by potash, left two grains of oxide of iron. The same alkaline liquor furnished  $5\frac{1}{2}$  grains of alumine by the muriate of ammonia.

*f.* Into this ammoniacal liquid, after having hypersaturated it with muriatic acid, a plate of zinc was dipped, which separated from it 0·20 of copper.

*Result of the above Analysis.*

Mercury	-	-	-	818·
Sulphur	-	-	-	137·50
Charcoal	-	-	-	23·
Silix	-	-	-	6·50
Alumine	-	-	-	5·50
				<hr/>
				990·50
				<hr/>

150 *Examination of the native Cinnabars of Japan, &c.*

		Brought over	990·50
Oxide of iron	-	-	2·
Copper	-	-	0·20
Water, which served for the formation of the sulphuretted hydrogen gas, and other loss	-	-	7·30
			<hr/> 1000· <hr/>

Those who are of opinion, with Messrs. Kirwan and Sage, that the mercury in this cinnabar is only partly combined with the sulphur, will see by this analysis that the two substances are in round numbers, as 1 and 6; and if there was any mercury not combined, the nitric acid would attack it. The idea entertained that this ore contained oxidated mercury besides cinnabar, may have arisen from the appearance of part of the mercury when distilling. But it arises entirely from the charcoal, which decomposes a part of the cinnabar, whether it takes from it its necessary quantity of oxygen, or forms at a high temperature carburetted sulphur. A distillation of artificial cinnabar with lamp-black absolutely presents the same phenomena.

Whether the mercury in the cinnabar is entirely exempt from oxygen, is a problem which is not yet resolved.

There is some appearance that the mercury exists in it in so very low a degree of oxidation, that it has hitherto escaped observation. In the examination of this subject it must not be lost sight of, that the mercury in cinnabar (analogous with some other metals oxidated at the *minimum*) resists the nitric acid; that in the making of cinnabar the passage of the ethiops to the state of cinnabar is always accompanied by an inflammation, and each inflammation seems to be an oxidation.