

XXII. *An Account of some chemical Experiments on Tabasheer.*By James Louis Macie, *Esq. F. R. S.*

Read July 7, 1791.

THE Tabasheer employed in these experiments was that which Dr. RUSSELL laid before the Society, as specimens of this substance, the evening his Paper upon the subject was read*.

There were seven parcels.

N^o 1. consisted of Tabasheer extracted from the bamboo by Dr. RUSSELL himself.

N^o 2. had been partly taken from the reed in Dr. RUSSELL's preference, and partly brought to him at different times by a person who worked in bamboos.

N^o 3. was the Tabasheer from Hydrabad; the finest kind of this substance to be bought.

N^{os} 4, 5, and 6. all came from Masulapatam, where they are sold at a very low price. These three kinds have been thought to be artificial compositions in imitation of the true Tabasheer, and to be made of calcined bones.

N^o 7. had no account affixed to it.

The Tabasheer from Hydrabad being in the greatest quantity, and appearing the most homogeneous and pure, the experiments were begun, and principally made, with it.

* See Phil. Transf. Vol. LXXX. p. 283.

Hydrabad

Hydrabad Tabasheer. (N^o 3.)

§ I. (A) This, in its general appearance, very much resembled fragments of that variety of calcedony which is known to mineralogists by the name of *Cacholong*. Some pieces were quite opaque, and absolutely white; but others possessed a small degree of transparency, and had a bluish cast. The latter, held before a lighted candle, appeared very pellucid, and of a flame colour.

The pieces were of various sizes; the largest of them did not exceed two or three tenths of an inch cubic. Their shape was quite irregular; some of them bore impressions of the inner part of the bamboo against which they were formed.

(B) This Tabasheer could not be broken by pressure between the fingers; but by the teeth it was easily reduced to powder. On first chewing it felt gritty, but soon ground to impalpable particles.

(C) Applied to the tongue, it adhered to it by capillary attraction.

(D) It had a disagreeable earthy taste, something like that of magnesia.

(E) No light was produced either by cutting it with a knife, or by rubbing two pieces of it together, in the dark; but a bit of this substance, being laid on a hot iron, soon appeared surrounded with a feeble luminous *aureole*. By being made red hot, it was deprived of this property of shining when gently heated; but recovered it again, on being kept for two months.

(F) Examined with the microscope, it did not appear different from what it does to the naked eye.

(G) A quantity of this Tabasheer which weighed 75.7 gr. in air, weighed only 41.1 gr. in distilled water whose temperature was 52.5 F. which makes its specific gravity to be very nearly = 2.188.

Mr. CAVENDISH, having tried this same parcel when become again quite dry, found its specific gravity to be = 2.169.

Treated with water.

§ II. (A) This Tabasheer, put into water, emitted a number of bubbles of air; the white opaque bits became transparent in a small degree only, but the bluish ones nearly as much so as glass. In this state the different colour produced by reflected and by transmitted light was very sensible.

(B) Four bits of this substance, weighing together, while dry and opaque, 4.1 gr., were put into distilled water, and let become transparent; being then taken out, and the unabsorbed water hastily wiped from their surface, they were again weighed, and were found to equal 8.2 gr.

In the experiment § I. (G), 75.7 gr. of this substance absorbed 69.5 gr. of distilled water.

(C) Four bits of Tabasheer, weighing together 3.2 gr. were boiled for 30' in half an ounce of distilled water in a Florence flask, which had been previously rinsed with some of the same fluid. This water, when become cold, did not shew any change on the admixture of vitriolic acid, of acid of sugar, nor of solutions of nitre of silver, or of crystals of soda; yet, on its evaporation, it left a white film on the glass, which could not be got off by washing in cold water, nor by hot
marine

marine acid; but which was discharged by warm caustic vegetable alkali, and by long ebullition in water.

Upon these bits of Tabasheer, another half ounce of distilled water was poured, and again boiled for about half an hour. This water also on evaporation left a white film on the glass vessel, similar to the above. The pieces of Tabasheer having been dried, by exposure to the air for some days in a warm room, were found to have lost one-tenth of a grain of their weight.

To ascertain whether the whole of a piece of Tabasheer could be dissolved by boiling in water, a little bit of this substance, weighing three-tenths of a grain, was boiled in 36 ounces of soft water for near five hours consecutively; but being afterwards dried and weighed, it was not diminished in quantity, nor was it deprived of its taste.

With vegetable colours.

§ III. Some Tabasheer, reduced to fine powder, was boiled for a considerable time in infusions of turnsole, of logwood, and of dried red cabbage, but produced not the least change in any one of them.

At the fire.

§ IV. (A) A piece of this Tabasheer, thrown into a red hot crucible, did not burn or grow black. Kept red hot for some time, it underwent no visible change; but when cold, it was harder, and had entirely lost its taste. Put into water it

grew transparent, just as it would have done, had it not been ignited.

(B) 6.4 gr. of this substance, made red hot in a crucible, were found, upon being weighed as soon as cold, to have lost two-tenths of a grain. This loss appears to have arisen merely from the expulsion of interposed moisture; for these heated pieces, on being exposed to the air for some days, recovered exactly their former weight.

(C) A bit of this substance was put into an earthen crucible, surrounded with sand, and kept red hot for some time; when cold, it was still white, both exteriorly and interiorly.

(D) Thrown into some melted red hot nitre, this substance did not produce any deflagration, or seem to suffer any alteration.

(E) A bit exposed on charcoal to the flame of the blow-pipe did not decrepitate or change colour; when first heated it diffused a pleasant smell; then contracted very considerably in bulk, and became transparent; but on continuing the heat it again grew white and opaque, but seemed not to shew any inclination to melt *per se*. Possibly, however, it may suffer such a semi-fusion, or softening of the whole mass, as takes place in clay when exposed to an intense heat; for when the bit used happened to have cracks, it separated during its contraction, at these cracks, and the parts receded from each other without falling asunder.

If, while the bit of Tabasheer was exposed to the flame, any of the ashes of the coal fell upon it, it instantly melted, and small very fluid bubbles were produced. That the opacity which this substance acquires on continuing to heat it after it is become transparent, is not owing to the fusion of its surface

surface by means of some of the ashes of the charcoal settling upon it unobserved, appeared by its undergoing the same change when fixed to the end of a glass tube, in the method of M. DE SAUSSURE *.

With acids.

§ V. (A) A piece of Tabasheer, weighing 1.2 gr. was first let satiate itself with distilled water; its surface being then wiped dry, it was put into a matrafs with some pure white marine acid, whose specific gravity was 1.13. No effervescence arose on its immersion into the acid; nor did this menstruum, even by ebullition, seem to have any action upon it, or itself receive any colour. The acid being evaporated left only some dark coloured spots on the glass. These spots were dissolved by distilled water. No precipitation was produced in this water by vitriolic acid, or by a solution of crystals of soda. The bit of Tabasheer washed with water, and made red hot, had not sustained any loss of weight.

The pores of the mass of Tabasheer were filled with water before it was put into the acid, to expel the common air contained in them, and which would have made it impossible to ascertain with accuracy whether any effervescence was produced on its first contact with the menstruum.

(B) Another portion of Tabasheer, weighing 10.2 gr. was boiled in some of the same marine acid. Not the least precipitate was produced on saturating this acid with solution of mild soda. This Tabasheer also, after having been

* Journal de Physique, Tom. XXVI. p. 409.

boiled in water, and dried by exposure for some days to the air, was still of its former weight.

§ VI. This substance seemed in like manner to resist the action of pure white nitrous acid boiled upon it.

§ VII. (A) A bit of Tabasheer weighing 0.6 gr. was digested in some strong white vitriolic acid, which had been made perfectly pure by distillation. It did not seem by this treatment to suffer any change, and after having been freed from all adhering vitriolic acid by boiling in water, it had not undergone any alteration either in its weight or properties. The vitriolic acid afforded no precipitate on being saturated with soda.

(B) Two grains of Tabasheer reduced to fine powder were made into a paste with some of this same vitriolic acid, and this mixture was heated till nearly dry; it was then digested in distilled water. This water, being filtered, tasted slightly acid, did not produce the least turbidness with solution of soda, and some of it, evaporated, left only a faint black stain on the glass, produced doubtless by the action of the vitriolic acid on a little vegetable matter, which it had received either from the Tabasheer, or from the paper. The undissolved matter collected, washed, and dried, weighed 1.9 gr.

§ VIII. 2 gr. of Tabasheer, reduced to fine powder, were long digested in a considerable quantity of liquid acid of sugar. The taste of the liquor was not altered; and being saturated with a solution of crystals of soda in distilled water, it did not afford any precipitate. The Tabasheer having been freed from all adhering acid, by very careful ablution with distilled water, and let dry in the air, was totally unchanged in its appearance, and weighed 1.98 gr. This Tabasheer being gra-

dually heated till red hot, did not become in the least black, or lose much of its weight, a proof that no acid of sugar had fixed in it.

With liquid alkalies.

§ IX. (A) Some liquid caustic vegetable alkali being heated in a phial, Tabasheer was added to it, which dissolved very readily, and in considerable quantity. When the alkali would not take up any more, it was set by to cool, but was not found next morning to have crystallized, or undergone any change, though it had become very concentrated, during the boiling, by the evaporation of much of the water.

(B) This solution had an alkaline taste, but seemingly with little, if any, causticity.

(C) A drop of it changed to green a watery tincture of dried red cabbage.

(D) Some of this solution was exposed in a shallow glass to spontaneous evaporation in a warm room. At the end of a day or two it was converted into a firm, milky jelly. After a few days more, this jelly was become whiter, more opaque, and had dried and cracked into several pieces, and finally it became quite dry, and curled up and separated from the glass.

The same change took place when the solution had been diluted with several times its bulk of distilled water, only the jelly was much thinner, and dried into a white powder.

Some of this solution, kept for many weeks in a bottle closely stopped, did not become a jelly, or undergo any change.

(E) A

(E) A small quantity of this solution was let fall into a proportionably large quantity of spirit of wine, whose specific gravity was .838. The mixture immediately became turbid, and, on standing, a dense fluid settled to the bottom, and which, when the bottle was hastily inverted, fell through the spirit of wine in round drops, like a ponderous oil.

The supernatant spirit of wine being carefully decanted off, some distilled water was added to this thick fluid, by which it was wholly dissolved. This solution, exposed to the air, shewed phenomena exactly similar to those of the undiluted solution (D).

The decanted spirit being also left exposed to the air in a shallow glass vessel, did not, after many days, either deposit a sensible quantity of precipitate, or become gelatinous; but having evaporated nearly away, left a few drops of a liquor which made infusion of red cabbage green; and, on the addition of some pure marine acid, effervesced violently. No precipitate fell during this saturation with the acid; nor did the mixture on standing become a jelly; and on the total evaporation of the fluid part, a small quantity of muriate of tartar only remained. The spirit of wine seems, therefore, to have dissolved merely a portion of superabundant alkali present in the mixture, but none of that united with Tabasheer.

(F) To different portions of this solution were added some pure marine acid, some pure white vitriolic acid, and some distilled vinegar, each in excess. These acids at first produced neither heat, effervescence, any precipitate, or the least sensible effect, except the vitriolic acid, which threw down a very small quantity of a white matter; but, after standing some days, these mixtures changed into jellies so firm, that
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the glasses containing them were inverted without their falling out.

This change into jelly equally took place whether the mixtures were kept in open or closed vessels, were exposed to the light, or secluded from it; nor did it seem to be much promoted by boiling the mixtures.

(G) Some solution of mild volatile alkali in distilled water, being added to some of this solution, seemed at the first instant of mixture to have no effect upon it; but in the space of a second or two it occasioned a copious white precipitate.

(H) The flakes remaining on the glasses at (D) and (E) put into marine acid raised a slight effervescence, but did not dissolve. These flakes, when taken out of the acid, and well washed, were found, like the original Tabasheer, to be white and opaque when dry; but to become transparent when moistened, and then to shew the blue and flame colour, § II. (A).

(I) The jellies (F), diluted with water, and collected on a filter, appeared to be the Tabasheer unchanged.

§ X. A bit of Tabasheer, weighing two-tenths of a grain, was boiled in 127 gr. of strong caustic volatile alkali for a considerable time; but after being made red hot, it had not sustained the least diminution of weight.

§ XI. (A) 27 gr. of Tabasheer, reduced to fine powder, were put into an open tin vessel with 100 gr. of crystals of soda, and some distilled water, and this mixture was made boil for three hours. The clear liquor was then poured off, and the Tabasheer was digested in some pure marine acid; after some time this acid was decanted, and the Tabasheer washed with distilled water, which was then added to the acid.

(B) This Tabasheer was put back into the alkaline solution, which seemed not impaired by the foregoing process, and again boiled for a considerable time. The liquor was then poured from it while hot, and the Tabasheeredulcorated with some cold distilled water, which was afterwards mixed with this hot solution, in which it instantly caused a precipitation. On heating the mixture it became clear again; but as it cooled it changed wholly into a thin jelly; but, in the course of a few days, it separated into two portions, the jelly settling in a denser state to the bottom of the vessel, leaving a limpid liquor over it.

(C) The Tabasheer remaining (B) was boiled in pure marine acid; the acid was then poured off, and the Tabasheeredulcorated with some distilled water, which was afterwards mixed with the acid.

(D) The remaining Tabasheer collected, washed, and dried, weighed 24 gr. and seemed not to be altered.

(E) The acid liquors (A and C) were mixed together, and saturated with soda, but afforded no precipitate.

(F) The alkaline mixture (B) was poured upon a filter, the clear liquor came through, leaving the jelly on the paper.

Some of this clear liquor, exposed to the air in a saucer, at the end of some days deposited a small quantity of a gelatinous matter; after some days more, the whole fluid part exhaled, and the saucer became covered with regular crystals of soda, which afforded no precipitate during their solution in vitriolic acid. What had appeared like a jelly while moist assumed, on drying, the form of a white powder. This powder was insoluble in vitriolic acid, and seemed still to be Tabasheer.

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Some of this clear liquor, mixed with marine acid, effervesced; did not afford any precipitate; but, on standing some days, the mixture became slightly gelatinous.

(G) Some of the thick jelly remaining on the filter, being boiled in water and in marine acid, appeared insoluble in both, and seemed to agree entirely with the above powder (F).

With dry alkalies.

§ XII. (A) Tabasheer melted on the charcoal at the blow-pipe with soda, with considerable effervescence. When the proportion of alkali was large, the Tabasheer quickly dissolved, and the whole spread on the coal, soaked into it, and vanished; but, by adding the alkali to the bit of Tabasheer in exceedingly small quantities at a time, this substance was converted into a pearl of clear colourless glass.

(B) 5 gr. of Tabasheer, reduced to fine powder, were melted in a platina crucible with 100 gr. of crystals of soda. The mass obtained was white and opaque, and weighed 40.2 gr. Put into an ounce of distilled water, it wholly dissolved. An excess of marine acid let fall into this solution produced an effervescence, and changed it into a jelly. This mixture was stirred about, and then thrown upon a filter. The jelly left on the paper did not dissolve in marine acid by ebullition; collected, washed with distilled water, and dried, it weighed 4.5 gr. and seemed to be the Tabasheer unaltered.

The liquor which had come through being saturated with mineral alkali yielded only a very small quantity of a red precipitate, which was the colouring matter of the pink blotting paper through which it had been passed.

(C) 10 gr. of Tabasheer, reduced to powder, were mixed with an equal weight of soda, deprived of its water of crystallization by heat. This mixture was put into a platina crucible, and exposed to a strong fire for 15'. It was then found converted into a transparent glass of a slight yellow colour. This glass was broken into pieces, and boiled in marine acid. No effervescence appeared; but the glass was dissolved into a jelly. This jelly, collected on a filter, well washed, and dried, weighed 7.7 gr.

The acid liquor which came through, on saturation with soda, afforded not the least precipitate; but, after standing a day or two, it changed into a thin jelly. This collected on a filter was washed with distilled water, and then boiled in marine acid, but did not dissolve. Being againedulcorated, and made red hot, it weighed 1.6 gr. The filtered liquor (B) would in all probability have changed similarly to a jelly, had it been kept. These precipitates were analogous to those § IX. (1).

(D) An equal weight of vegetable alkali and Tabasheer were melted together in the platina crucible. The glass produced was transparent; but it had a fiery taste, and soon attracted the moisture of the air, and dissolved into a thick liquor. But two parts of vegetable alkali, with three of Tabasheer, yielded a transparent glass, which was permanent.

Treated with other fluxes.

§ XIII. (A) A fragment of Tabasheer put into glass of borax, and urged at the blow-pipe, contracted very considerably in size, the same as when heated *per se*; after which it continued turning about in the flux, dissolving with great difficulty

and very slowly. When the solution was effected, the saline pearl remained perfectly clear and colourless.

(B) With phosphoric ammoniac (made by saturating the acid obtained by the slow combustion of phosphorus with caustic volatile alkali) the Tabasheer very readily melted on the charcoal at the blow-pipe, with effervescence, into a white frothy bead.

(C) Fused, by the same means, on a plate of platina, with the vitriols of tartar and soda, it appeared entirely to resist their action; the little particles employed continuing to revolve in the fluid globules without sustaining any sensible diminution of size, and the saline beads on cooling assumed their usual opacity.

(D) A bit of Tabasheer was laid on a plate of silver, and a little litharge was put over it, and then melted with the blow-pipe. It immediately acted on the Tabasheer, and covered it with a white glassy glazing. By the addition of more litharge the mass was brought to a round bead, though with considerable difficulty. This bead bore melting on the charcoal, without any reduction of the lead, but could not be obtained transparent.

(E) The ease with which this substance had melted with vegetable ashes, led to the trial of it with pure calcareous earth. A fragment of Tabasheer, fixed to the end of a bit of glass, was rubbed over with some powdered whiting. As soon as exposed to the flame of the blow-pipe, it melted with considerable effervescence; but could not, even on the charcoal, and with the addition of more whiting, be brought to a transparent state, or reduced into a round bead.

Equal weights of Tabasheer and pure calcareous spar, both reduced to fine powder, were irregularly mixed, and exposed
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in the platina crucible to a strong fire in a forge for 20'; but did not even concrete together.

(F) When magnesia was used, no fusion took place at the blow-pipe.

(G) Equal parts of Tabasheer, whiting, and earth of alum precipitated by mild volatile alkali, were mixed in a state of powder, and submitted in the platina crucible to a strong fire for 20', but were afterwards found unmelted.

Examination of the other specimens.

N° I.

This parcel contained particles of three kinds; some white, of a smooth texture, much resembling the foregoing sort; others of the same appearance, but yellowish; and others greatly similar to bits of dried mould.

The white and yellowish pieces were so soft as to be very easily rubbed to powder between the fingers. They had a disagreeable taste, something like that of rhubarb. Put into water, the white bits scarcely grew at all transparent; but the yellow ones became so to a considerable degree.

The brown earth-like pieces were harder than the above, had little taste, floated upon water, and remained opaque.

Exposed to the blow-pipe, they all charred and grew black; the last variety even burned with a flame. When the vegetable matter was consumed, the pieces remained white, and then had exactly the appearance, and possessed all the properties, of the the foregoing Tabasheer from Hydrabad, and like it melted with soda into a transparent glass.

N° II.

Also consisted of bits of three sorts.

(a) Some white, nearly opaque.

(b) A few small very transparent particles, shewing, in an eminent degree, the blue and yellow colour, by the different direction of light.

(c) Coarse, brownish pieces of a grained texture.

These all had exactly the same taste, hardness, &c. and shewed the same effects at the blow-pipe, as N° I.

27 gr. of this Tabasheer thrown into a red-hot crucible, burned with a yellowish white flame, lost 2.9 gr. in weight, and became so similar to the Hyderabad kind as not to be distinguished from it.

Some of this Tabasheer put into a crucible, not made very hot, emitted a smell something like tobacco ashes, but not the kind of perfume discovered in that from Hyderabad, § IV. (E).

N° IV

All the pieces of this parcel were of one appearance, and a good deal resembled, in their texture, the third variety of N° II. Their colour was white; their hardness such as very difficultly to be broken by pressure between the fingers. In the mouth they immediately fell to a pulpy powder, and had no taste.

A bit exposed on the charcoal to the blow-pipe became black, melted like some vegetable matters, caught flame, and burnt to a botryoid inflated coal, which soon entirely consumed away, and vanished.

A piece put into water fell to a powder. The mixture being boiled, this powder dissolved, and turned the whole to a jelly.

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These properties are exactly those of common starch.

N° V.

Agreed entirely with N° IV. in appearance, properties, and nature.

N° VI.

The pieces of this parcel were white, quite opaque, and considerably hard. Their taste and effects at the blow-pipe, were perfectly similar to those of the Hydrabad kind.

N° VII.

Much resembled N° VI. only was rather softer, and seemed to blacken a little when first heated. With fluxes at the blow-pipe it shewed the same effects as all the above.

Conclusion.

1. It appears from these experiments, that all the parcels, except N° IV. and V. consisted of genuine Tabasheer; but that those kinds, immediately taken from the plant, contained a certain portion of a vegetable matter, which was wanting in the specimens procured from the shops, and which had probably been deprived of this admixture by calcination, of which operation a partial blackness, observable on some of the pieces of N° III. and VI. are doubtless the traces. This accounts also for the superior hardness and diminished tastes of these sorts.

2. The nature of this substance is very different from what might have been expected in the product of a vegetable. Its indestructibility by fire; its total resistance to acids; its uniting
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by fusion with alkalies in certain proportions into a white opaque mass, in others into a transparent permanent glass; and its being again separable from these compounds, entirely unchanged by acids, &c. seem to afford the strongest reasons to consider it as perfectly identical with common *siliceous earth*.

Yet from pure quartz it may be thought to differ in some material particulars; such as in its fusing with calcareous earth, in some of its effects with liquid alkalies, in its taste, and its specific gravity.

But its taste may arise merely from its divided state, for chalk and powdery magnesia both have tastes, and tastes which are very similar to that of pure Tabasheer; but when these earths are taken in the denser state of crystals, they are found to be quite insipid; so Tabasheer, when made more solid by exposure to a pretty strong heat, is no longer perceived, when chewed, to act upon the palate, § IV. (A).

And, on accurate comparison, its effects with liquid alkalies have not appeared peculiar; for though it was found on trial, that the powder of common flints, when boiled in some of the same liquid caustic alkali employed at § IX. (A), was scarcely at all acted upon; and that the very little which was dissolved was soon precipitated again, in the form of minute *flocculi*, on exposing the solution to the air, and was immediately thrown down on the admixture of an acid; yet the precipitate obtained from *liquor silicum* by marine acid was discovered, even when dry to dissolve readily in this alkali, but while still moist to do so very copiously, even without the assistance of heat; and some of this solution, thus saturated with siliceous matter by ebullition, being exposed to the air in a shallow glass, became a jelly by the next day, and the day after dried, and cracked, &c. exactly like the mixtures § IX.

(D and E). And another portion of this solution mixed with marine acid afforded no precipitate, and remained perfectly unaffected for two days; but on the third it was converted into a firm jelly like that § IX. (F).

As gypsum is found to melt *per se* at the blow-pipe, though refractory to the strongest heat that can be made in a furnace, it was thought that possibly siliceous and calcareous earths might flux together by this means, though they resist the utmost power of common fires; but experiment shewed, that in this respect quartz did not agree with Tabasheer. But this difference seems much too likely to depend on the admixture of a little foreign matter in the latter body, to admit of its being made the grounds for considering it as a new substance, in opposition to so many more material points in which it agrees with flint.

Nor can much weight be laid on the inferior specific gravity of a body so very porous. The infusibility of the mixture § XIII. (G) depended also, probably, either on an inaccuracy in the proportions of the earths to each other, or on a deficiency of heat.

3. Of the three bamboos which were not split before the Royal Society I have opened two. The Tabasheer found in them agreed entirely in its properties with that of N° I. and II.

It was observed, that all the Tabasheer in the same joint was exactly of the same appearance. In one joint it was all similar to the yellowish sort N° I. In another joint of the same bamboo, it resembled the variety (c) of N° II. Probably, therefore, the parcels from Dr. RUSSELL, containing each several varieties of this substance, arose from the produce of many joints having been mixed together.

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4. The ashes, obtained by burning the bamboo, boiled in marine acid, left a very large quantity of a whitish insoluble powder, which, fused at the blow-pipe with soda, effervesced, and formed a transparent glass. Only the middle part of the joints was burned, the knots were sawed off, left, being porous, Tabasheer might be mechanically lodged in them. However, the great quantity of this remaining substance shews it to be an essential, constituent part of the wood.

The ashes of common charcoal, digested in marine acid, left in the same manner an insoluble residuum which fused with soda with effervescence, and formed glass; but the proportion of this matter to the ashes was greatly less than in the foregoing case.

5. Since the above experiments were made, a singular circumstance has presented itself. A green bamboo, cut in the hot-house of Dr. PITCAIRN, at Islington, was judged to contain Tabasheer in one of its joints, from a rattling noise discoverable on shaking it; but being split by Sir JOSEPH BANKS, it was found to contain, not ordinary Tabasheer, but a solid pebble, about the size of half a pea.

Externally this pebble was of an irregular rounded form, of a dark-brown or black colour. Internally it was reddish-brown, of a close dull texture, much like some martial filiceous stones. In one corner there were shining particles, which appeared to be crystals, but too minute to be distinguished even with the microscope.

This substance was so hard as to cut glass!

A fragment of it exposed to the blow-pipe on the charcoal did not grow white, contract in size, melt, or undergo any change. Put into borax it did not dissolve, but lost its colour,

and tinged the flux green. With soda it effervesced, and formed a round bead of opaque black glass.

These two beads, digested in some perfectly pure and white marine acid, only partially dissolved, and tinged this menstruum of a greenish yellow colour; and from this solution Prussite of tartar, so pure as not, under many hours, to produce a blue colour with the above pure marine acid, instantly threw down a very copious Prussian blue.

P. S. In ascertaining the specific gravity of the Hyderabad Tabasheer, § I. (G), great care was taken in both the experiments that every bit was thoroughly penetrated with the water, and transparent to its very center, before its weight in the water was determined.

