



V. On the assaying of iron ores and iron-stones by fusion

Mr. David Mushet

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if scorched, at the end of from fifteen to twenty days, and the plants themselves die at the end of four or five weeks.

No seed germinates in oil. A single grain of common salt in two hundred grains of water is sufficient to retard the vegetation of plants, and may even kill them if they are watered with that saline liquor *.

Shavings of horn, next to infusion animals, are the most favourable to vegetation : charcoal holds the third rank.

V. On the Assaying of Iron Ores and Iron-Stones by Fusion.
By Mr. DAVID MUSHET, of the Clyde Iron Works †.

IT will easily be conceived, from the mode of operation which I have adopted, that, in order to procure accurate results, the proportion of flux must be varied according to the mixtures in the iron-stones or ores ; and that no universal solvent can be used as capable of assaying *all* ores.

As the gradation of mixtures in the ores is almost imperceptible, there are, in fact, no fixed limits by which Nature has distinguished the various classes : we find all the varieties diminishing their predominant earth, and assuming, in equal proportions, those of each other, thus constituting the class of equalised mixtures ; yet, here, the variety of combination ceases not, the predominating earth gradually becomes the minor part of the mixture, and that which only held a second rank, as to quantity, is now the chief component earth ; the permutation goes round, till the earth, which existed in the most sparing quantity, now predominates to excess.

* C. Sylvestre obtained a result absolutely similar, by employing marine salt as manure.

† The present is a part of the communication from Mr. Mushet which appeared in our Number for July last, (Vol. IV. p. 178.) but by an oversight of the Editor was omitted in its place. It contains the table of proportions alluded to in our Number for September last (Vol. IV. p. 360.) requisite for the obtaining from all the various iron-stones an accurate assay, and should have immediately followed Mr. Mushet's article given in our July number.

In such an infinity of variation it is difficult to arrange the combinations of which these substances are capable. To derive the name of a class, or genus, from the predominancy of an earth, seems most eligible; and to consider those as varieties of the same class, which are altered by the proportion of the second and third mixtures. Again, each of these varieties are susceptible of a multiplicity of modifications before an earth is so far diminished as to give an ascendancy to another, or before the third rank of proportion has assumed that of the second or first. The simple combination of the earths, and their degrees of predominancy, may be thus arranged:—

	1st Variety,		2d Variety.	
Argillaceous iron-stone	{	Iron	-	Iron
		Clay	-	Clay
		Lime	-	Silex
		Silex	-	Lime
Calcareous iron-stone	{	Iron	-	Iron
		Lime	-	Lime
		Clay	-	Silex
		Silex	-	Clay
Siliceous iron-stone	{	Iron	-	Iron
		Silex	-	Silex
		Lime	-	Clay
		Clay	-	Lime

As these become varied, they form the class of equalised mixture.

To assay any of these varieties, a flux peculiar to the nature of the mixture is necessary; so that the changes of proportion in the solvent ought to extend to seven, including the class of equalised mixtures, in order that the precise same quality of crude iron may be produced from all the varieties of iron-stone. The modification of each variety will be found to be sufficiently accurate, if assayed by the flux peculiar to itself. The arrangement of the three classes of ores into two varieties, each forming a distinct stage of combination, indicated by the predominancy of the first and second earth, are, with the neutral class, sufficiently minute for any purpose in the assay-furnace, and are sufficient to form an

accurate and extensive knowledge of the analogy of these results with those in the blast-furnace.

TABLE of PROPORTIONS of FLUXES.

Let the earthy part of an argillaceous ore be composed of clay 9, lime 6, sand 3 = 18.

To assay 4 troy ounces of this ore	-	or	1920 grains,
add 4	———	bottle glafs	— 1920
3	———	chalk	— 1440
$0\frac{1}{2}$	———	charcoal	— 240
<hr/>			<hr/>
$11\frac{1}{2}$			5520

Let the second variety of argillaceous ores contain, clay 10, filix 7, lime 3 = 20.

In this case, 4 ounces troy of ore	-	or	1920 grains,
would require 4	———	bottle glafs	— 1920
4	———	chalk	— 1920
$0\frac{3}{4}$	———	charcoal	— 360
<hr/>			<hr/>
$12\frac{3}{4}$			6120

Let the first variety of the calcareous genus of iron-stone be supposed to contain, of earthy mixtures, lime 14, clay 6, filix 4 = 24.

When this iron-stone is to be assayed,

to 4 ounces troy	-	or	1920 grains,
add 5	———	bottle glafs	— 2400
$1\frac{1}{2}$	———	chalk	— 720
$0\frac{3}{4}$	———	charcoal	— 360
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$11\frac{1}{4}$			5400

Again, let the second variety of the calcareous genus be supposed to contain, lime 10, sand 6, clay 4 = 20.

I would add to 4 troy ounces	-	or	1920 grains,
4	———	bottle glafs	— 1920
2	———	chalk	— 960
$0\frac{1}{2}$	———	charcoal	— 240
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$10\frac{1}{2}$			5040

Let

Let the first variety of filiceous ores be supposed to contain, filex 12, clay 8, lime 5 = 25.

For an assay of	4 troy ozs. of ore	-	or	1920 grains,
add	4	—	chalk	— 1920
	3	—	bottle glafs	— 1440
	$0\frac{3}{4}$	—	charcoal	— 360
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	11 $\frac{3}{4}$			5640

And, lastly, let the second variety of this genus of iron-stone be supposed to contain, filex 10, lime 7, clay 5 = 22.

To	4 troy ounces of the ore	-	or	1920 grains,
add	$3\frac{1}{2}$	—	chalk	— 1680
	3	—	bottle glafs	— 1440
	$0\frac{3}{4}$	—	charcoal	— 360
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	11 $\frac{1}{4}$			5400

Clafs of equalifed mixtures, compofed of, clay 7, lime 7, filex 7 = 21.

To assay of this ore	4 troy ounces		or	1920 grains,
add	$3\frac{1}{2}$	—	bottle glafs	— 1680
	$2\frac{1}{2}$	—	chalk	— 1200
	$0\frac{1}{2}$	—	charcoal	— 240
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	10 $\frac{1}{2}$			5040

VI. *On the real Origin of that Refin known under the Name of Sandarac, and that of Gum Arabic.* By M. SCHOUSBOE *.

GUM Sandarac is an article of trade brought from the fouthern provinces of the kingdom of Morocco. About fix or feven hundred quintals of it are exported every year from Santa Cruz, Mogador, and Saffy. In the language of the country it is called *El graffa*. The tree which produces it is a *Thuia*, found alfo by M. Vahl in the kingdom of

* From a Danifh Journal, entitled, *The Physical, Medical, and Economical Library*, Part III. 1799.