nearly the same alkaline proportions as ordinary sugar; the second assay, made with a portion of the liquor, heated to 100 degrees, would produce the same quantity of lime as that which was dissolved by an equal volume of pure water. This quantity is very small, and will saturate 4 cubic centimetres of the pure solution of sulphuric acid per decilitre.

Although the liquor assumes a brown tint, the point of saturation may be easily determined by adding thereto a little more litmus, and stopping immediately, the solution, which has become of a greenish tint, assumes a clearer hue by the addition of sulphuric acid.

The assaying of saccharine liquids is carried on in the above manner; it is only necessary to have the precaution to operate on liquors marking 6 or 8 degrees on the areometer of Beaumé.

The juice of beetroot and sugar possesses these properties. The quantity of slack lime employed in these liquids should be almost equivalent to the presumed quantity of sugar in the produce to be assayed: this quantity is shown approximatively by the areometric degree of the liquor.

Lond. Jour. of Arts and Sci.

On the Manufacture of Gas for Illumination from Water. By
M. JOBARD.

[From the Bulletin du Musée d'Industrie.]

A certain quantity of carburetted hydrogen gas, suitable for illuminating purposes, may be produced by the distillation of coal, rosin, fatty matters, and oils; but at the same time, a considerable quantity of hydrocarburets of hydrogen is produced in the form of tar, naphthaline, paraffine, pyrogenous oils, &c., which are deposited in the apparatus, either in a liquid or solid form.

Now these substances, which are rendered useless and injurious to the manufacture of the gas, by the present mode of operating, are precisely those which are the most rich in illuminating properties. It has, therefore, been proposed to dissolve these hydrocarburets in hydrogen gas possessing no illuminating properties, and thereby rendering it capable of affording light, as the carbon is the source of the illuminating power. The whole of the year 1833 was devoted to experiments for this purpose, and to the production of apparatus for charging with carbon the hydrogen gas produced by Dobereiner's lamp.

These experiments were successful beyond expectation, and the result was laid before the Royal Academy of Brussels, upon which they appointed a commission to inquire into it, by whom the following report was presented in the sitting of 4th January, 1834:—

“The commission appointed at the last meeting, to examine the effect of the lamp constructed by M. Jobard, now presents its report, from which it appears that the commissioners are convinced that the gas burnt with a very white and brilliant flame (equal to 36 candles of six to the pound,) and that, being desirous of ascertaining its illu-

minating power, by a comparison of the shadows, they find that the light of this gas, issuing from a 12-hole Argand burner, is at least double that of the coal-gas furnished by the Brussels Gas Company when burnt in a 12-hole Argand burner, pierced with holes three times the size, which are employed for lighting most of the shops in this town. These observations appear completely to answer the questions put by M. Jobard to the Royal Academy.

“In order fully to appreciate his invention, it should be worked on a large scale, and an account kept of the economy effected, which he could not communicate to us without making us acquainted with his mode of operating, and which he wishes to keep secret.”

The commission being desirous of seeing this invention worked on a larger scale, I had a gasometer constructed, and burners placed in every apartment in my house; a single burner was sufficient to light the largest room brilliantly, and a saving of several centimes was effected for each burner: this resulted from sulphate of iron being produced during the operation. The gas was charged with carbonaceous vapors by passing it through a cylinder containing about two quarts of oil of gas-tar, which was not exhausted at the expiration of eight days, during which time the experiments were continued. I think it right to enter into all these details for the benefit of those persons who might feel desirous of taking up this invention, which is on the eve of becoming public property.

Some doubt still remained as to whether the gas would retain the illuminating power after being confined in gasometers and traversing a considerable length of pipe; it appeared to me that very likely, in winter-time, the carbon mechanically combined with the gas, might become disengaged and deposited.*

The following fact, contained in Thenard's Treatise on Chemistry, was sufficient to put me in the right path:—*Gases combine at the moment of formation.*

A brevet was taken by me in Belgium for the production of hydrogen gas, by the decomposition of steam in vertical retorts, filled with incandescent coke, and for uniting this gas, *at the moment of formation*, with hyper-carburetted gas produced by the distillation of fixed oils, or any other hydro-carburets. I afterwards went to Paris, where, by deed, I gave up my invention to Messrs. Selligie and Tripier, in consideration of the sum of 10,000 francs and a third of the profits, on condition that M. Selligie should pass as the inventor; and as such he received the large gold medals from the Society of Encouragement and the Academy of Industry. He was about to receive the gold medal at the exhibition of 1839, and also the Cross of the Legion of Honor, for what Baron Thenard called *this splendid invention*, when I was summoned before a jury to declare the truth.

It was useless to dissemble before a jury composed of such men as Baron Thenard, Gay Lussac, Brongniart, Darcet, Dumas, Payen, &c. I simply shewed my Belgian brevet, our agreement, and M. Selligie's

* This was the case in winter-time at St. Vallier, near St. Etienne, in the manufactory of Messrs. Chareten & Son, lighted by 240 burners.

receipt. The case was not long in being decided; the Selligue gas, and also the Selligue system of sinking wells, which I had given up to him by the same agreement, were both deprived of their false name at once.

Mr. Selligue has, however, contributed his mite, for he constructed several horizontal furnaces, which would not work, before he adopted my vertical plan, and which worked successfully at Antwerp, the description of which will be given hereafter.

The towns of Dijon and Strasburg, and two of the faubourgs of Lyons and Paris had been for some time lighted with this gas, which, after being opposed for some time by powerful continental gas companies, was on the point of sinking into oblivion, when it was taken up in Dublin and even in London.* It was with great pleasure I saw it come into use in that country, abounding with coal, as I thought it would only be used in those countries where coal is scarce and dear; a plan was then adopted in Paris, which I had previously proposed, and which consisted in causing gas obtained by the decomposition of water, to take up hydro-carburets produced by the distillation of coal gas, at the moment of its formation. Twice or thrice the quantity of illuminating gas could be obtained by this means than by the ordinary method. The illuminating power of ordinary gas might also be easily doubled by passing it through a vessel filled with carburets of hydrogen, slightly heated, as described in my brevet.

By combining pure hydrogen gas, at the moment of formation, with coal-gas, charged with an excess of carbon, the necessity of purifying it is done away with, as the ammonia and sulphurets of hydrogen liberated are dissipated and lose their intensity; but by employing oil of schistus, or fish, or other oil, any purification will be unnecessary; this is, therefore, another advantage.

Being desirous of making the public acquainted with the advantages of this new system, and not having any further interest in the matter, I think it right to state the reasons which were given in opposition to it, by publishing the report read by M. Arago, at a meeting of the Academy of Sciences, December 3rd, 1838.

I will also refer to the Bulletin of the Society of Encouragement of the same year, for the report of Messrs. Dumas and Payen, in consequence of which, one of the grand prizes of the Society was granted to M. Selligue.

In the following year a patent was taken in England, in the name of M. de Val Marino. About the same time, this invention found its way into Austria, and fell into the hands of M. Offenheim, by whom it was offered for sale in Belgium to the inventor himself, with whom M. Offenheim was not acquainted.

To return to the explanations presented to the Academy of Sciences—they are as follows:—

Hydrogen gas is charged with carbon by passing it through a hollow cylinder, *heated to redness*, where it meets with highly carburetted

* Gas made from water was used in Dublin by Mr. Kelly, of Upper Gloucester-street; in London, by Mr. Stones, of 25, Golden-square; and under the arches of Waterloo Bridge.

oils. A chemical combination, and not merely a mixture, then takes place, as is proved by the analysis of M. Peligot, Professor at the Polytechnic School, which was as follows:—

Carburets of hydrogen,	-	-	57
Oxide of carbon,	-	-	28
Free hydrogen,	-	-	15
			100

The theoretical question of illumination is therefore as follows:—

“What is the process which will produce the largest quantity of light from 1 lb. of either oil, resinous matter, schistus, or coal-tar?”

“One pound of oil of rosin or schistus produces in the new apparatus 35 cubic feet of gas, 3 feet of which are burnt in an hour in a burner giving a light equal to ten candles, which is equal to 23 hours light. Now, at Belleville, Antwerp, Frankfort, and wherever gas has been manufactured from *oil of rosin*, and from pure rosin, the average quantity produced was from 7 to 9 feet for every pound of oil, but in three or four days it fell to from 6 to 8 feet. Separate experiments with new retorts may furnish from 12 to 13 feet, and the production of this quantity has been announced by M. Tailleberg as a grand discovery. Let us take this quantity, although it is nearly double the average; two feet and a half of this gas must be burnt per hour to furnish a light equal to ten candles, according to a report upon the lighting of the town of Antwerp, in October, 1837, with rosin gas, and in October, 1838, with gas made from water. Let us only reckon $2\frac{1}{2}$ feet;—1 lb. of oil therefore furnishes $6\frac{1}{2}$ hours light, and admitting 17 feet for every pound to be the product, which cannot be obtained without the addition of water, it would even then only give 15 hours light, whilst the water-gas furnishes 23.”

But there are other facts which can be proved without dispute. The production of gas from water does not stop at 35 feet per pound. By augmenting the quantity of water with respect to the oil in the apparatus, the gas becomes weaker and weaker, until its density approaches and even exceeds that of coal-gas. In experiments made with more than 1500 cubic feet, and watched for several consecutive hours, the rate of production was 111 feet of gas for every pound of fish oil (oil of schistus produced exactly the same result.)

It was only necessary to burn 6 feet of this gas in order to produce a light equal to 10 candles, which was but in a very slight degree less brilliant than coal-gas. Gas produced at the rate of 55 feet per pound of oil of schistus gave a consumption of 4 feet in the same burner. Thus, supposing the water-gas to be produced at the rate of 80 feet to the pound, it is equal in power to the coal-gas, and burns but 5 feet per hour. One pound of oil will therefore give 20 hours light. Let us reckon the cost of this illumination with oil of schistus, which only costs about 2s. for every 100 lbs., and a consumption of combustibles which is diminished in proportion to the quantity of gas produced and the size of the apparatus; whilst, on the contrary, with rosin gas, as the decomposition of the gas takes place on the surface of the me-

tal, the small retorts are the most advantageous; and, at the same time, the mass of gas produced is not augmented, but simply its volume, and this only by decarburating the richest portion of the carburets of hydrogen, by the action of a higher temperature.

The indefinite augmentation of the light obtained from the water-gas, in proportion as it is produced weaker or stronger, tends to prove that the presence of oxide of carbon augments the illuminating power of gas, no doubt augmenting at the same time the quantity of heat developed during combustion.

I shall not, therefore, be accused of exaggeration when I state that there is some value in a process, the principle of which is to decompose water, a substance of no value, by means of coke, which is of very little value,—as under this process, 1 lb. of oil, which costs a halfpenny, will supply a burner giving a light equal to ten candles, during twenty hours.

Ibid.

The Staffordshire Potteries.

Pottery is one of the most ancient and characteristic branches of national industry; we know of no product of mechanical ingenuity so early discovered as the potter's wheel, and in the Eastern hemisphere its use appears to have been almost universal from a date lost in the darkness of remote antiquity. Some forms of the fictile art were known to the natives of America before that continent was discovered by Columbus; but, though the wheel seems to have been unknown, a simple contrivance was employed which was no bad substitute; it was simply a stick which the workman held by the middle and twirled round inside whatever vessel he fabricated, to ensure its circular form. The Egyptians were probably the first who attempted to apply the Decorative Arts to their productions in earthenware; but the Greeks soon surpassed them in this respect, for they sought ideal beauty in form and color as well as in ornament. Their colonies in Italy still further extended the manufacture and the range of decoration: while the Etrurians established a school of Art of their own, which attained in its peculiar branches the highest degree of perfection.

Without entering on the history of pottery in modern times—a subject too important to be discussed incidentally—we may notice that most of the European nations have been anxious to cultivate this branch of manufacture, and that even monarchs have not thought the production of porcelain unworthy their attention. In England, where everything is left to the exertions of the people, and nothing is derived from the protection or patronage of the Government, the development of the production of porcelain and the finer kinds of earthenware has been equally spontaneous and extraordinary. Wedgwood was to this branch of industry what Arkwright was to the cotton trade; he lived to see the fictile art brought to high perfection, and to see that his success had stimulated worthy rivals to emulate him in extent of production and beauty of the article produced. Unfortunate-