### Aldehyde in the Distillation of Sugar.

The annexed interesting article is by Prof. Volckel, of Germany, and is selected from the Annals of Chemistry and Pharmacy :—

"In my memoir upon the products of the distillation of sugar, a volatile fluid is described under the name of "yellowish fluid;" it is the first that comes over during the distillation of sugar-vinegar, begins to boil at 86° Fah., and distils over for the most part between 140° and 149° Fah. Closer investigation showed that this fluid contained acetone, a volatile yellow-colored oil, and very probably aldehyde. The latter betrayed itself by its characteristic odor, and its behaviour with solution of potash and uitrate of silver and ammonia. Wood-spirit could not be detected in this fluid.

In the above memoir I left it undecided whether aldehyde really does occur amongst the products of the distillation of wood, until I should have the opportuuityof instituting some further experiments with this view. In fact, in my former investigation, the greater part of the yellowish fluid was employed in the endeavor to ascertain whether or no wood-spirit occurred amongst the products of the distillation of sugar; the smaller portion, which was specially intended for the search for aldehyde, was lost in consequence of the application of too strong a heat in driving off the water, during an attempted separation of the acetone from the aldehyde by means of finely-powdered chloride of calcium. The positive proof of the existence of a very small quantity of aldehyde amongst the products of the distillation of sugar did not appear to me, at that time, when I was still much occupied with the investigation of the other products of the dry distillation of sugar and wood, of such importance that I should again undertake a series of distillations of sugar, especially as the formation of aldehyde during the decomposition of organic bodies had already been demonstrated by Hess and Scanlan. I have however, since endeavored to fill up this gap in my previous investigations.

During the distillation of sugar vinegar, a yellow fluid, of penetrating aldehyde-like odor, is the first thing to pass over. This was rectified for further examination on the water-bath, with the addition of a small quantity of solution of carbonate of soda to neutralize any adherent acids; it was then deprived of water by chloride of calcium, and distilled, the matter first passing over being especially collected. This fluid has still a slight tinge of yellow. It mixes in all proportions with anhydrous ether. If this mixture be saturated with anhydrous ammoniacal gas, colorless crystals are produced in a short time, possessing all the properties of aldehyde-ammonia. Not the smallest doubt therefore can exist that aldehyde is formed during the distillation of sugar, although in very small quantity.

Aldehyde is also certainly present in small quantity in the products of the distillation of wood, and is perhaps the cause that wood-spirit, which has been freed by distillation upon lime from those oils, such as furfurole, which are volatilized with difficulty, and by these means rendered colorless, again acquires a color, and deposits a brown substance when causticpotash is dissolved in it.

The occurrence of a small quantity of formic acid in sugar-vinegar is probably intimately connected with the formation of aldehydes during the distillation of sugar. Thus both together contain the same equivalents of hydrogen and oxygen :—

1 equiv. aldehyde - - - - - $=C^4 H^4 O^2$
1 equiv. hydrate formic acid - - $=C^2 H^2 O^4$

$H^6 H^6 H^6$

The simultaneous formation of aldehyde and formic acid by the exposure of sugar to heat may therefore be as readily understood as the formation of the hydrates of carbon, acetic acid, assamar and furfurole.

The yellow color of the fluid passing over at 149° Fah., which both according to the previous and present investigations consists essentially of acetone and aldehyde, arises from the presence of yellow, volatile, readily-changeable oils, which distil over principally between 176° and 320° Fah., and possesses a different constitution from furfurole.

These oils are produced only in very smal quantity in the distillation of sugar. They polsess a strong penetrating odor, and are converted into brown substances, which are only sparingly soluble in potash, by the action of alkalies, or even of their carbonates. The true constitution of these volatile oils could not be ascertained, as the small quantity in which they were obtained admitted of no further separation.

In my previous investigation, only that portion of them which passed over between 284° and 302° Fah., which however is always much contaminated with furfurole, whose boiling point is 324° Fah., was submitted to analysis. In the present case, that portion of these volatile oils which distils between 176° and 212° Fah., was also analyzed.

0·2085 grm. of this fluid gave 0·479 grm. of carbonic acid and 0·182 grm. of water. In 100 parts—

| | |
|---|---|
| Carbon | 62·72 |
| Hydrogen | 9·69 |
| Oxygen | 27·59 |

The whole quantity of this oily fluid, which was obtained from the products of distillation of 8 lbs. of sugar, amounted only to between 2 and 3 grms. The fluid is lighter than water, in which it is tolerably soluble, especially with the assistance of heat. It communicates a yellow color to water.

This oily fluid is also present in the products of the distillation of wood; with furfurole it is the cause of the yellow color of crude wood-spirit.

[For the Scientific American.]

### Pure and Impure Gas.

In No. 24, present volume, of your paper, you gave us a very sensible article under the above. And in conclusion you say "cannel coal being free from sulphurets, is to be preferred for making gas, and if *our* gas companies do not now use the American cannel in place of bituminous they exhibit an amazing want of good sense and sound information, in relation to the best kind of coal to employ in their business."

I can tell you why *our* gas companies do not use the American cannel. What you say of its superiority for making light is eminently true. It contains much more hydro-carbon vapor and olefiant gas than the bituminous coal. Now the reason it is not used instead of the bituminous, I would perhaps best convey by giving a short conversation that took place last summer between the working superintendent of a western gas company and myself; to wit:

"What kind of coal do you use here for making gas?

Why, bituminous coal!

What do you pay for it per bushel?

Four and a half cents!

What do you get for coke per bushel?

Five cents.

How many bushels of coke will thirty bushels of bituminous coal leave after the gas is roasted out of it?

About forty bushels!

Do you know that the cannel coal found near you here on the banks of the Ohio makes a much more brilliant gas—easier and more copiously extracted than the bituminous?

Yes, I do, but it makes *scarcely any* coke, and would not be profitable to the gas company!

But the company might charge more for the gas, because it is so much more luminous, less offensive, and less corrosive than the other?

Yes, but the people grumble at the high price now, and would not be willing to advance!

Well, would not the increased consumption caused by supplying a better article remunerate the company for the change from bituminous to cannel?

I don't know, I guess the company know their own interest best!

Here the conversation stopped after I remarked that it would seem the company was a coke manufacturing concern instead of a gas-lighting company, inasmuch as the light was but the secondary consideration of their operations.

This is plainly the reason why *our* companies do not use the American cannel. It is rich in hydro-carbon vapor, and olefiant matter, but leaves no coke.

I still think your concluding remarks are right. If the gas companies were not too rapacious after big dividends to see the advantages they must ultimately derive from the increased consumption of a superior light, they would use the cannel altogether. In your city they use two-thirds cannel and one-third New-Castle, the light of which is superior, especiallyin proportion to the quantity of gas consumed, to any made from bituminous in the United States. This was the case in June last. Its specific gravity then was full 550, atmosphere being 1,000, which is considerable heavier than any other I used for ballooning purposes. In a balloon of 9,000 cubic feet capacity filled with the New York gas, it weighed 65 pounds more than the same quantity did from works using bituminous coal, I had therefore to ascend with but 15 pounds of ballast at New York, while at Zanesville and other places where the bituminous coal was used, I took 80 pounds of ballast.

The sulphurous and ammoniacal vapors issuing from gas burners, especially under high pressures, are very corrosive upon jewelry, and very destructive upon books, and indeed upon all fine textile fabrics. They are also very injurious to weak lungs. These evils would not exist if the American cannel coal was used for gas, with ordinary care of purification; and we have it in abundance, and so pure, on the banks of the Ohio, that a splint of the raw coal burns with a flame as brilliant as a wax candle, specimens of which I have in my possession now. JOHN WISE.

Lancaster, Pa., Feb. 27th, 1854.

### Decimal Coinage in England.

Dr. Bowring, on the eve of returning to China to hold an important official situation, is sparing no efforts to enlighten the good people of England in relation to the advantages of introducing the system of decimal coinage. The following is the conclusion of one of his speeches on this subject:

"The only change which a decimal system would effect in our currency would be as regards the copper coinage; it leaves the gold and silver untouched. I would take the pound sterling as the integer, as I feel the advantage of recognising a point of departure which is consecrated by the earliest records of this country, and which existed long before the conquest, as the groundwork of all accounts; this course having been adopted by every country which has yet adopted the decimal system. I therefore come to the conclusion that to leave the pound sterling untouched, and only operate upon the copper currency, is the true and intelligible, and commercial, and philosophical system. I propose that the pound should be divided into a thousand parts, and as far as regards names, that the names given should represent the value.

I shall be very glad to suggest the substitution of the word 'mill' for farthing, and shall be very glad to see the word 'cent' taken for ten of these mills, and the word 'dime' for 100, that word having been received by the Americans, being in reality one of our oldest Saxon words. Its only effect upon the well-being of the people would be that instead of 48 farthings for every shilling they would get, 50, and instead of 24 for every 6d, they would have 25. Therefore, I venture to ask from this great community its assistance in accomplishing an object the progress of which I shall, from that farthest region in which I shall be placed, look on with great interest, and respecting which the Chancellor of the Exchequer said to me, only the day before yesterday—'Prepare public opinion, and you shall have the decimal coinage.'"

### Special Notice.

The correspondence of this office is immense, and we are every dayin receipt of letters which indicate merely the town the writer resides in, the county and state being omitted. This is very annoying, and we earnestly solicit those who write us in future to give not only their own names but also the name of the town, county, and State, to which they desire their letters to be addressed. This insures a prompt reply, and saves us from a perplexing annoyance.

### Combustion and Evaporating Power of Boilers.

MESSRS. EDITORS.—Permit me to propound through the columns of the "Scientific American," the following question, which is of considerable importance to the engineering world :—

If a given quantity of carbon, and an equivalent quantity of oxygen combine together at a low temperature, say 1000 degrees, will the amount of heat thus produced be the same as if the carbon and oxygen were combined at a temperature of 2000 degrees, the carbonic acid the result of the combustion weighing the same in both cases? Will not the temperature of the carbonic acid in the latter case be double that of the former.

For example, if I have two boilers of the same construction and size, with the exception that the fire space of one is twice as large as that of the other, the larger using natural draught, and the smaller a blast, both boilers evaporating an equal weight of water in a given time, will the evaporating power of a given quantity of coal be the same in both boilers.

A. K. R.

New York March, 1st. 1854.

[The *quantity* of heat produced by the perfect combustion of coal is the same, whether the combination of the carbon with the oxygen to produce carbonic acid, takes place under a high or low degree of heat. The great object in the combustion of fuel under boilers is to make the water absorb the greatest amount of the heat generated by combustion in the shortest possible time. The example presented for solution is not one that will lead to any satisfactory result. The great question is, what is the proper amount of fire space and heating surface to absorb the greatest amount of the heat in a given time, under any condition. One boiler may have a fire space ten times larger than another of the same size, and yet not generate as much steam in a given time from the same quantity of fuel. To generate steam fast, the heat must be intense; this is the reason why a blast is necessary in locomotives.

### The Fast Line.

An intelligent German mechanic, of this city, has authorized John S. Selby, the actuary of the Maryland Institute, to obtain for him a sufficient space in the Crystal Palace Exhibition, at New York, for the display of a steam power, which he will prove to be capable of propelling a vessel across the ocean in thirty-six hours. The actuary has complied with his request.—[Baltimore Sun.

MESSRS. EDITORS.—The above appeared in the Boston "Star Spangled Banner," in March 26, 1853. Can you give me any information respecting it; by so doing you will oblige

Yours, J. B.

[All nonsense, sir. It would require a vessel to move with an average velocity of 83⅓ miles per hour to cross the ocean from New York to Liverpool in thirty-six hours. Those wonderful inventions which are so often heralded in some of our papers, cannot be trusted. We never saw the engine or apparatus referred to, in the Crystal Palace.

### Marine Locomotives.

Since we published an illustrated description of Mr. Frost's Marine Locomotive on page 180, we have received quite a number of communications from correspondents on the subject, the majority of them condemning the project as impracticable, and some presenting plans of their own, which they consider far superior. Every inventor naturally thinks a great deal of his own invention, and cannot view it in the same light as a person who has no personal interest in the matter. We have expressed no views favorable to Mr. Frost's project, because we could not do so upon any Scientific or engineering principle whatever.

### Steam Fire Engine.

A Committee of gentlemen, from Louisville, Ky., appointed to examine and report on the working of the Cincinnati Fire Engine, after having witnessed its performance, determined to recommend one of such engines for Louisville.

### Notice—Water Wheels.

We shall next week commence to publish a series of articles on Re-action Water Wheels, which will contain much practical information.

© 1854 SCIENTIFIC AMERICAN, INC