

test usually employed. Furthermore, by simultaneously proceeding with tubes containing known amounts of fluoride, this process may be made roughly quantitative.

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The Disposal of Ammonia, Tar and Gas from By-Product Coke Ovens.—The writer's attention has been called to a review in the June number of the *Journal*, of the book entitled "A Short Treatise on the Destructive Distillation of Bituminous Coal," in which the reviewer draws some conclusions as to the disposal of coke oven by-products that hardly seem justified when the rapid development of these markets in recent years is considered, as well as their present status. The review questions whether the addition of a plant carbonizing 1,000 tons of coal daily, to the present by-product oven installation, producing approximately three and a quarter million gallons of tar and 3,500 net tons of ammonium sulphate per year, would not so depress the by-product market as to "deprive that type of construction not only in the new plants, but also in those previously erected, of the greater part, if not all, of the advantages resulting from its output of by-products."

The market for ammonia in all forms, including sulphate, has undergone an increase from 18,000 net tons of sulphate equivalent produced in 1899, to 54,664 net tons in 1904, or, roundly, 200 per cent. increase in five years. The average price has consistently risen during this addition and has shown to date no tendency to recede. As the imports of sulphate were 6,976 net tons in 1899, and 15,288 net tons in 1905, any apprehension as to a catastrophe in this particular industrial field by the addition of 3,500 tons to the home production may well be laid aside until needed. Such an installation as cited requires a year for its completion, which is ample notice for the market to adjust itself to requirements. To one who appreciates the vast field open to ammonium sulphate as a fertilizer, and who is aware that the United States, the greatest agricultural country in the world, now uses but one-third of the nitrogen used as a fertilizer in Germany, per unit of population, including the large nitrate of soda imports in both countries, such apprehensions seem idle.

The market for tar, it is true, furnishes more reasonable ground for conservatism. The tar from the 3,000 odd by-product coke

ovens now in existence in this country has practically all come on the market within the last ten years, there having been but 72 by-product ovens in 1895, according to Dr. Parker's report. The total production of coal tar from gas works and by-product ovens was 69,498,085 gallons in 1904, according to the same authority. Of this, 41,726,970 gallons or 60 per cent. was produced in the gas works, the balance, 27,771,115 gallons or 40 per cent. being produced in the by-product coke ovens; therefore the addition of the by-product coke oven tar to the existing gas works production represents at least 66 per cent. increase, besides that due to the extension of the gas production itself. As the Geological Survey reports above referred to were not issued as early as 1895, we have no accurate data on this point, but the report by Dr. Wm. B. Phillips in 1898 gives the production of tar in gas works for that year as 24,384,798 gallons. The amount in 1895 was assuredly less than this. Contrasting this figure, however, with the present production we see that an increase has taken place of approximately 200 per cent. up to and including 1904, and including 1905, it will approximate 250 per cent. increase. Under these conditions the value of the tar, quoted in 1898 at 3.7 cents per gallon by the above authority has fallen to 3.04 cents in 1904. This is a loss, to be sure, but it is by no means a serious one. It must be remembered that the first resort for the tar producers in a low market is to burn it as a fuel, for steam raising, etc., for which purpose it is equivalent to coal at a ratio of 5 pounds of tar for 8 pounds of coal. Therefore, where coal is worth \$3.75 per net ton, tar can be burned with equal economy at a cost of 3 cents per gallon, or where coal costs \$3.12, tar is worth 2.5 cents per gallon.

Even under the tremendous expansion that the coal tar manufacturing industry has undergone, prices in this country have never averaged as low as those prevailing in England and Germany. Nevertheless in these countries the by-product oven system is constantly gaining ground, and in Germany in particular is now far in the lead. A far greater proportion of the United States tar production goes into the manufacture of prepared roofing and for water-proofing than is the case in either of these other countries. A great and immediate increase in the tar production might conceivably so far modify these conditions as to cause American prices to approach the English figures,

but this would detract but little from the economic advantages of the by-product coke oven process.

It is therefore clear that, for both ammonia and tar, the market conditions are far from supporting any apprehension as to their immediate future. Both have shown a remarkable capacity for extension without resort to the less remunerative avenues of disposal, and the demand for both seems to be constantly on the increase.

As regards disposal of gas, it is said that the market for fuel and illuminating gas is now fully supplied. But the source of this supply is based on the constant consumption of coal or petroleum oil, barring the cases where natural gas is used. Therefore the question of supply rests on a constant outlay for raw materials. If a supply of completely or partially manufactured gas of higher quality can be offered to the gas companies at the same cost, or an equally good quality at a lower net cost than the existing method of raw material supply and manufacture comes to, they will inevitably turn to the new and more economical source. It is merely a matter of dollars and cents. And that these arguments are worthy of consideration and that such conditions can and do prevail, is attested to by the fact that a considerable number of American cities are now successfully using the gas from by-product coke ovens for all or a large part of their illuminating and fuel requirements. The fact that in nearly every case a continual increase in the gas consumption has made frequent extensions of the gas-making plant necessary, and that the lowering of the price of gas extends its use enormously, must also be given due consideration. There are few American cities that do not anticipate larger gas plants, lower gas prices and greater consumption in the near future.

For these reasons it does not appear to the writer that the immediate extension of the by-product coke oven industry will be fraught with disaster to the by-product markets. In the light of what has gone before, the future does not seem otherwise than most promising.

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