

has been absorbed, as in the following case where the chlorine has been first manufactured by the decomposition of  $\text{NaCl} + \text{MnO} + \text{HSO}$ , the chlorine has been set free, and is then passed into water for use for gold-recovery, &c. This chlorine is free gas, dissolved in water. The chlorine as liberated from the oxychloride salt is in a nascent condition, and is therefore more active; being liberated in contact with the ore it is in the best condition to combine with the gold, tellurium, &c. Much depends upon the various uses to which the solution is to be put as to the percentage of salt and the electrical power required.

Our apparatus is so constructed that the electrical resistance is at its minimum, enabling us to produce the oxychlorides without the expenditure of the high electro-motive force that has hitherto been found necessary. This means low cost of production of the oxychloride-solutions, small wear-and-tear of the plant, being enabled to use large cells, and at a low cost of maintenance. Hitherto the apparatus that have been devised to bring about similar results have been constructed with necessarily small anodes of platinum or platinum iridium—costly to provide, and entailing high electro-motive force to pass the necessary current.

*Cost of Production.*—The cell now in course of erection will require 7-horse power to generate 1,492 amperes at  $3\frac{1}{2}$  volts. This current will produce in one hour for each ampere 1.3236 grams; that is, about  $4\frac{1}{2}$  lb. of free chlorine per hour at a cost of  $3\frac{1}{2}$ d. Assuming that at ordinary chlorination-works a solution contains 80 grains of available chlorine in a cubic foot of solution, it works out at something like 6 oz. of chlorine to the ton of solution. At this rate this cell will produce sufficient chlorine for  $3\frac{1}{2}$ d. for 7 tons of solution. The above costs are based on coal at £1 5s. per ton, and a consumption of  $2\frac{1}{2}$  lb. of coal per electric horse-power, and assuming the use of salt water or brine. Purchasing salt at £2 per ton, the total cost would be about 1d. per pound of chlorine. According to Dr. Kellner, 2,800 kilos. (2 tons 15 cwt.) of goods can be bleached with a solution containing 3 kilos. ( $6\frac{1}{2}$  lb.) of chlorine, costing, by our process, with purchased salt as shown above, 6d.

DEAR SIR,—

31st March, 1905.

In reply to letter from Messrs. Lind and O'Connor, flax-millers, Shannon, New Zealand, we beg to give you the following information based on bleaching the sample they sent to you and half of which we enclose for transmission to them.

1. The sample was bleached by us by passing oxychloride through it for two hours, then washing the fibre in water, and drying. We think that they would find that the most convenient way in practice; and concrete vats should be used, with a false bottom of perforated tiles, through which the liquor would pass to admit of circulation. The liquor passing through false bottom is withdrawn from concrete vats and pumped back to electrolysing machine to be brought back to strength. This rate of circulation can be arranged as required for the speed of bleaching. The process should be very cheap indeed, and result in enormous saving of time as compared with present methods. Further, our liquor does not injure the tensile strength of fibre, whilst bleaching in the open for ten to fourteen days must do so. It would be as well to have a wringer between bleach-vat and washing-vat, so that the oxychloride liquor may be expressed as far as possible, and thus economize salt. If the colour of our bleach is not exactly what they want, it is only a matter of a very little more or less time to get it, and only practice can determine that. The weight of sample was 34 grams before bleaching, and 33 grams after bleaching, so that there is practically no loss of weight. You will observe that some portions are not bleached, and we must explain that these portions are the outer skin of the plant not removed by the scutching-machine, and which will not bleach without an alkali treatment. That, however, is unnecessary, as the spots unbleached will probably not show when spun. In any case the quality of the bleach will depend on quality of work done by the stripper—that is, the cleaner the fibre is stripped the more even the bleach.

2. There are no fumes from the oxychloride liquor, and it is not poisonous or dangerous to life.

3. It is not corrosive, and will not injure the hands. On the contrary, it is a splendid antiseptic, and is used in hospitals in surgical cases.

4. Unfortunately, the solution cannot be shipped to New Zealand, because it would have a bleaching effect on the wood of the casks, and its strength would probably be exhausted on arrival.

We shall be glad to make any further tests for your friends, or supply any information they may desire.

If they decide to adopt our process, they should advise us what quantity of flax they propose treating daily, and if eight, ten, or twelve hours a day.

Yours, &c.,

A. C. Arthur, Esq., Winchester House, E.C.

FOR OXYCHLORIDES LIMITED.

DEAR SIR,—

62, London Wall, London, E.C., 31st March, 1905.

Yours of the 9th February, enclosing a specimen of New Zealand flax with various questions as to the time, &c., for bleaching same with oxychloride. I have laid your letter before the Oxychloride board, and I now enclose you their answer, which, I think, deals with every one of your questions, and fully and satisfactorily explains them. Also, I am returning you the sample bleached.

You see it would be useless to send any of the liquid out, as it loses its strength, and therefore it is necessary to have a plant on the spot to make it; and when returning the liquid you have used through the machine it is as good as when first made. What seems to me a very important point is that the bleaching apparently does not in any way reduce the strength of the fibre. That small portion of the flax where the green pulp has not been taken away by the scutcher is not amenable to being bleached quite white. This may be somewhat detrimental, but there appears to be a small proportion of that, and it may pay to put it through some caustic soak previous to