subsequent chlorination. The cost by this process was £1 14s. a ton; and the average result from January 15, 1884, to April 15, 1885, was an extraction of 95·23 per cent. These concentrates varied in value from £21 12s. to £30 a ton before roasting, and from £29 4s. to £41 8s. a ton after roasting. The treatment of these pyrites raw, thus saving roasting-expenses amounting to £1 3s. a ton, would hardly be profitable, for between £1 16s. and £2 8s. per ton more than by chlorination would be lost in the tailings, and in all probability the consumption of cyanide would be large, owing to the presence of sulphates. No saving would be effected by treating the ores by cyanide after roasting, since chlorination then costs but 15s. per ton.

The North Carolina pyrites were experimented upon by R. M. Eames and Son. The ore was iron-pyrites disseminated through slate rock. The solution was comparatively strong, 2 per cent., and the time five days. Another sample of ore was treated which analysed as follows:—

Silica ...	60·30
Alumina	9·00
Iron ...	12·00
Copper	6·00
Sulphur	9·50
Magnesia	2·00
Lead, manganese, and lime	Traces.

The results on this ore, which assayed 3oz. of gold to the ton, were very poor, the extraction being but 5 per cent.

The zinc-blende concentrates were treated by Mr. C. W. Merrill. An analysis of this ore was as follows:—

	Per Cent.
Silica ...	49·31
Sulphide of copper	0·18
Pyrite...	6·43
Galena	6·39
Blende	37·69
Total	100·00

This ore yielded 33 per cent. of its gold by free amalgamation. After deflagration with bicarbonate of soda, leaching with water, and decomposition by acid, the residue showed a nugget of free gold.

Mr. Merrill ascribes the poor results on this ore to the great affinity of zinc for cyanogen, which rendered inert the affinity of cyanogen for gold; but the good results obtained from the Black Jack concentrates of the Ravenswood Mine, Queensland, which are now treated by chlorination, show that this theory is probably erroneous. The interference of this mineral cannot be considered proved as yet. In all probability it was the presence of iron salts, not showing by acid reaction, which caused the difficulty.

Experiments were made by the State Mining Bureau of California on pyrites typical of those reduced in the chlorination-works at Sutter Creek (Cal.), and assaying 5·1oz. of gold per ton. The following results, showing the effect of time on the efficiency of cyanide, were obtained with a 1-per-cent. solution:—

Time in Hours.	Extraction per Cent.
2	64·71
3	68·63
4	69·63
6	74·51
8	78·44

The sulphurets in physical condition were as fine as those treated by chlorination.

After grinding the ore through a 100-mesh screen, 82·36 per cent. of the gold was extracted; and after grinding in an agate mortar and digesting with three different solutions of cyanide, the extraction was 90·2 per cent. A second lot of sulphurets, ground through a 120-mesh screen, yielded 90·6 per cent. of their gold after eight hours' digestion with a 1-per-cent. solution.

Conclusions and Deductions.—It will be seen that many favourable results have been obtained by the experimental treatment of pyritic ore; but it must be remembered that in these tests, with large excesses of chemicals, the important factor of cost does not enter. This cost, as will be explained in another place, does not arise from mechanical difficulties, but is owing to chemical troubles, due almost solely to the decomposition of the solution by salts which are always present in partially-decomposed pyritic ore. It may be, and probably is, quite possible to neutralise these salts by alkalies, but even then the cost will be high, for the excess of chemicals, which must be used, has a tendency to increase the consumption of cyanide and of zinc in the precipitating bases.

In South Africa no success has been obtained as yet with this class of ore, and it seems more than doubtful if it ever will be. The field in this country is still open, however, to intelligent work in this direction. To effect economical and successful working, the constituents of the ore must be known, and their variations in composition discovered in time to modify the treatment so as to secure the best results.

The Plant.

It has been stated that the cyanide process is so simple that the plant may consist of old barrels or tanks, placed together in any way, with crushing machinery of any description. The absurdity of such a statement is apparent to the metallurgists, but not always to the miner. The process is not complicated, it is true, but it is far from being simple, and a proper arrangement of the plant not only increases the percentage of extraction and the capacity of a mill, but reduces work-