$$a = \frac{100\, F_{B_1}\,(s + s_1) - 100\, s_{B_1}\, F_C}{s_1\, F_{B_1}}$$

$$b = \frac{10000\,(F_C\, s_{B_1} - F_{B_1}\, s)}{s_1\, F_{B_1}}$$

In the equation for E only the minus sign has to be taken.

Example:

	Nov. 29, 1894.	Dec. 1, 1894.
Tons ground.....	1105	1056

Regular feed on the carrier:

$F_{B_1} = 41.94$; $F_C = 10.64$; $s_1 = 10.95$; $s = 9.785$; $s_{B_1} = 4.80$.

Substituting in the equation for E we have

$$E = 89.12 - \sqrt{-7824.05 + 7942.37}$$

$$= 78.25 \text{ per cent.}$$

It is obvious that in order to get good results extreme care must be taken to obtain an average sample of the cane and the bagasse, or the results will not represent the true facts. I will admit that it is not easy to obtain such an average sample and that exact methods for determination of the woody fiber and sucrose in cane and bagasse have not yet been found. In the future I will report more fully on this subject.

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ON SILICIDES OF IRON.

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Received September 23, 1895.

IRON and silicon readily unite at a high temperature. Silicides of iron of a definite composition have been made by Hahn.[1] He obtained compounds of the formula: Fe_2Si, FeSi, and $FeSi_2$.

Since carbon readily reduces silica at the temperature of the electric arc, I expected to obtain silicides of iron with a large percentage of silicon by heating iron with silicon and carbon in an electric furnace. Iron filings, charcoal and sand were used and a silicide was obtained that contained from twenty-three to twenty-seven per cent. of silicon. In order to obtain this compound there must be an excess of sand and carbon. This com-

[1] *Ann. Chem.* (Liebig). 129. 57.

pound is white, crystalline, very hard, brittle and very little magnetic, the more so however if the percentage of silicon decreases. It conducts the electricity very well. In a pure condition it forms sometimes crystals of one cm. long. These crystals have the formula Fe_3Si_2.

	Calculated.	Found.	
Silicon	25.04	25.17	25.30
Iron	74.96	74.75	....

The specific gravity is 6.36. This compound is very resistant against acid oxidizing agents. A sample of the silicide was ground and sieved through a 100 mesh sieve.

Cold aqua regia ($1HNO_3 + 3HCl$) dissolved by frequent stirring in two days 9.86 per cent., and in nine days 10.57 per cent. Of a sample of silicide containing 12.85 per cent. of silicon 66.84 per cent. was dissolved by the same reagent in two days. The commercial silicide of iron contained about eleven to thirteen per cent. of silicon, the original silicide contained 24.1 per cent. of silicon, that treated for nine days with aqua regia contained 27.2 per cent., which shows that only iron but no appreciable amount of silicon had been dissolved. The silicide is quite decomposed by hydrofluoric acid and also if it be melted with a mixture of sodium and potassium carbonate to which some potassium nitrate has been added.

Silicides of iron of great purity can be formed from impure materials like coke and river-sand. Iron ore may replace the filings.

I have also prepared in the electric furnace silicides of a higher percentage of silicon, *i. e.*, 29.3, 33.3, and 46.2 per cent.

These silicides seem to be mixtures of the compounds Fe_3Si_2 and $FeSi_2$. The latter compound is described by Hahn as metallic greyish crystals.

The material richest in silicon which I obtained contained :

	Calculated for $FeSi_2$.	Found.
Silicon	50.26	46.22
Iron	49.84	53.76

The specific gravity of this material was 4.851. It was very brittle, crystalline, grey and nonmagnetic. Aqua regia dissolved in two days only 0.76 per cent. of the material that had been sieved through a 100 mesh sieve.

WILLSON ALUMINUM CO., SPRAY, N. C.