

Yusaku FUKUDA and Hideya MIZUKAMI

(Horio Laboratory)

The thin slices (longitudinal sections) of about 200 μ thickness of the spruce (Ezomatsu from Hokkaido) were cooked by the soda process. The removed amount of lignin, pentosan and cellulose, changes in D.P. of the cellulose and mechanical properties of residues (the residues themselves as well as the products delignified by means of NaClO_2) were determined at the various stages of cooking and compared with sequence in the case of the sulfate cooking, which was reported in the previous paper.

The rates of the cooking reaction and of the consumption of effective alkali during soda cooking are much slower than in the case of sulfate cooking, but the removed amount of lignin, pentosan and cellulose for same yield of residues are almost the same, irrespective of the cooking processes throughout the whole stages of cooking. The D.P.'s and the values representing the mechanical properties of delignified soda pulp reach a maximum point at a high yield such as about 80% and then begin to fall gradually with decreasing yields of residues. This is very different from the case of sulfate process where the maximum value of D.P. and maximum mechanical strength was found to happen at a yield of about 45–50%. The residues having such a yield could easily be defibrilated. Therefore, the mechanical properties of soda pulp having a yield of 45–50% are always much inferior to those of the sulfate pulp having the same yield.

The more remarkable degradation of cellulose at the later stage of soda cooking would be due to the fact that it has been exposed to a stronger effective alkali for a longer period of time at a high temperature. This will account for the smaller D.P.'s and lower values of strength of soda pulp than those of sulfate pulp.

21. Study on the Continuous Alkali Cellulose Shredder

Masao HORIO and Michihiro TAKAHAMA

(Horio Laboratory)

Continuous shredders used for alkali cellulose such as J.B. or Eirich type which is now being adopted industrially in many viscose rayon mills, have several defects as follows:

- 1) Generally speaking, the shredded state of alkali cellulose is ununiform and its particle has many cores.
- 2) The alkali cellulose adheres to the inside of shredder and the cellulose is dried by air and this becomes the cause of free fibers which obstruct the filtration of viscose.
- 3) The temperature of alkali cellulose is raised during the crushing, and thus

the crusher must be cooled to avoid the ununiformity of aging.

The general idea of the mechanism of crushing of alkali cellulose has been that the alkali cellulose is crushed by the grinding between the opposite discs.

According to the authors' research, the slit which is formed by outside edges of the fixed part and the rotating plate is definitely conducted to the shredding of alkali cellulose.



Based on the above idea, the continuous shredder was designed (see photo).

The state of crushed alkali cellulose is superior to other crushers, thus the above noted defects have completely been dissolved.

22. Studies on Coal Sulfur

Behaviour of Coal Sulfur in Carbonisation of Anthracite

Wataru FUNASAKA, Shigeru KAJIYAMA and Seiji TAMAI

(Kodama Laboratory)

It is little known about the distribution of sulfur in carbonisation products in case of coal carbonisation, and the results are uncertain. This fact is presumably attributed to the difference of the apparatus and condition for carbonising coal, as well as the rank of coal samples and forms of sulfur compounds in coal *etc.*

We carried out the carbonisation of anthracite under certain carbonising conditions and determined the sulfur balance for the carbonisation products.

Experiments. For the carbonisation experiments, we employed the Kings-Gray's apparatus with the apparatus to determine the sulfur in gas.

The coal sample was Kishu-anthracite, and its analytical data were as follows:
Moisture 5.04 %, Ash 19.57 %, Volatile matter 8.89 %, Fixed carbon 66.41 %;

Total Sulfur 2.44 %, Sulfate Sulfur 0.57 %, Pyrite Sulfur 0.20 %, Organic Sulfur 1.67 %.

The carbonisation experiments were carried out at every 100° from 400° to 1000°C. The coal samples were carbonised with heating rate 5°C /min. and 3°C /min., and maintained for *ca.* 1 hr. at fixed temperature. The determination of sulfur content was as follows:

Inorganic sulfur in gas (H_2S) was precipitated as CdS , and then determined by