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—ABSTRACT FROM THE TRANSACTIONS—

STUDY OF PULP REFINING I.
ON THE EXCLUSION OF RESIN IN PULP.

By **Yasusuke Shinomiya**

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When needle-leaf-trees are used as pulping material, there will be an abominable phenomena, which leads to a pitch trouble in pulp-making, paper-making and artificial Cellulose industries. And by using wood of Manchuria, it is a fact that such a phenomena will be caused especially.

The present author has tried to make the experiment to escape the pitch trouble under the following five testing points.

1. General character of resin.

By studying the difference between the resin in original wood and that after various amounts of work for pulping which led to trouble.

The results obtained are to be seen in the 1st and 2nd table. The resin after various amounts of work for pulping has changed greatly by oxidation, polymerization and combination with salts.

2. Excluding ability for resin by using alkali.

Take a sample of unbleached pulp and add alkali solution in 1, 15, 2, 3, 5%, treating time 3 hours, treating temperature 50°C, while take a sample of unbleached pulp after chlorination and add alkali Solution 1, 3, 5, 8%, treating time 3 hours, treating temperature 50°C and 85°C~95°C and examine if above all matters there had been excluding abilities for resin.

The results are as follows in the 3rd, 4th and 5th table.

3. Excluding ability for resin by using "Bentnite".

Test the following examination, taking advantage of absorbing properties of "Bentnite".

Add Bentnite with 1, 3, 5, 10%, treating time 1 hour, and there will be found a variation in the colour of resin the results of which are as in table 6.

Table 1.
Composition of natural and Cooking-after resin.

	natural resin in wood.	resin in strong pulp.	resin in rayon pulp.
Saponification Value	123.4~136.4	98.5~107.9	116.7
Acid Value	78.03	14.02	—
Melting point °C	31.3~65.1	17.8	37.1
Specific gravity	1.05	1.06	1.07
Unsaponifiable Matter. %	18.89	35.1	—
Ash. %	Trace	1.06	1.36
CaO in ash. %	—	0.41	0.59
Fe ₂ O ₃ in ash %	—	0.06	0.36
Alcohol in soluble residue. %	—	15.7	20.7
Saponification value on alcohol insoluble residue	—	109.3	88.8
CaO in alcohol insoluble residue. %	—	0.49	0.56
Fe ₂ O ₃ in alcohol insolu- ble residue. %	—	0.26	0.33
Saponifiable matter in al- cohol soluble. %	81.11	48.1	51.3
CaO in alcohol soluble. %	—	0.21	0.25
Fe ₂ O ₃ in alcohol soluble. %	—	0.07	0.03
Unsaponifiable matter in alcohol soluble. %	18.89	36.2	28.0

Table 2.
Solubility of strong pulp resin on various Solvents.

Solvent	Soluble matter.	insoluble matter.	Notes
Ether. %	100	0	Boiling point.
alcohol. %	79.3	20.7	"
1% NaOH + 2% soap soln. %	100	0	"
petroleum. %	88	12	normal temperature.
petroleum. %	71	29	100°C
3% NaOH + 1% Na ₂ CO ₃ %	88	12	Boiling point.
1% NaOH %	82	18	"
1% NaOH + 2% Na ₂ SO ₄ %	72	28	"
1% NaOH + 1% Na ₂ SO ₄ %	71	29	"
17% NaOH %	19	81	"
2% Na ₂ SO ₄ %	12	88	"

Table 3.
diminish rate of ash and resin by various concentration of alkali.

Addition of alkali	averaged ash of untreatment pulp	averaged resin of untreatment pulp	treatment temperature and hour.	averaged ash of treatment pulp.	diminish rate of ash	averaged resin of treatment pulp	diminish rate of resin
%	%	%	°C/Ht	%	%	%	%
0.5	0.249	1.284	50/3	0.203	18.4	0.683	46.8
1.0	0.261	1.233	50/3	0.159	39.1	0.569	53.5
1.5	0.225	1.280	50/3	0.174	22.6	0.541	57.7
2.0	0.260	1.059	50/3	0.170	34.6	0.431	59.3
3.0	0.239	1.154	50/3	0.162	32.6	0.445	61.8
5.0	0.195	1.115	50/3	0.110	43.6	0.390	65.0

Table 4.
diminish rate of Ash and resin by various concentration of alkali on after chlorination.

addition of alkali	averaged ash of untreatment pulp	averaged resin of untreatment pulp.	treatment temperature and hour.	averaged ash of treatment pulp.	diminish rate of ash	averaged resin of treatment pulp	diminish rate of resin
%	%	%	°C/Ht	%	%	%	%
1.0	0.249	1.284	50/3	0.159	36.14	0.654	49.07
3.0	0.261	1.233	50/3	0.144	44.86	0.550	55.39
5.0	0.265	1.186	50/3	0.143	46.03	0.458	61.38
8.0	0.224	1.145	50/3	0.128	42.85	0.355	68.99

Table 5.
diminish rate of ash and resin by various Concentration of alkali on after chlorination.

addition of alkali	averaged ash of untreatment pulp	averaged resin of untreatment pulp	treatment temperature and hour.	averaged ash of treatment pulp.	diminish rate of ash	averaged resin of treatment pulp	diminish rate of resin
%	%	%	°C/Ht	%	%	%	%
1.0	0.249	1.284	80/3	0.139	44.17	0.531	58.64
3.0	0.261	1.233	80/3	0.142	45.59	0.419	66.01
5.0	0.265	1.186	85/3 以上	0.133	50.19	0.323	72.76
8.0	0.224	1.145	85/3 以上	0.114	49.11	0.247	78.42

4. Variation in quantity of resin by seasoning.

Testing the Cooking process with industrially using various matters that are of the same wood but differ in seasoning, we found a variation in the quantities of unbleached pulp. The results are as in table 7.

As it is plain in the analytical result of unbleached pulp, we see that there is a great effect upon the composition of pulp by long or short seasoning.

Summarising the above results are as follows.

Table 6.
diminiss rate of resin by bentnite treatment.

addition of Bentnite	averaged ash of untreatment pulp.	averaged resin of untreatment pulp.	treatment temperature and hour.	averaged ash of treatment pulp.	averaged resin of treatment pulp.	diminish rate of resin.
%	%	%	C°/Ht	%	%	%
1.0	0.249	1.284	69.6/1	0.221	0.573	55.37
3.0	0.261	1.233	71/1	0.244	0.700	43.22
5.0	0.265	1.186	71/1	0.254	0.751	36.67
10.0	0.224	1.145	73/1	0.227	0.861	24.80

Table 7.
Unbleachable pulu composition by wood seasoning.

	averaged Cooking number.	bleach- ability	α -Cellulose	β -Cellulose	viscosity 1% Conc.	viscosity 0.5% Conc.	Ash	Resin
A	1.~13. 15.	%	%	%			%	%
B	14. 16.~18.	%	%	%			%	%
		9.13	89.22	2.85	22.46	6.23	0.262	1.258
		9.12	91.21	2.54	24.58	5.82	0.157	0.388

A =12 month seasoning.

B =24 month seasoning.

1. The wood to be used has been cooked after seasoning as a as posible 18~24 months.
2. The washing of the pulp after working has been done with alkali treating.with alkali solu-
tion of about 1% or Bentnite treating with Bentnite of about 1% a additions.
3. The above detailed pulp after treating with alkali or Bentnite was chlorinated and then
added alkali 3%, treating temperature 85~95°C, 3~4 hours high temperature the alkali treating
has been done.

We found that the improvement of the pulp quality is possible by the above process.