

Metals content of constant kappa 30 SW Kraft pulp employed in this study. Metals contents are in units of mg/kg.

• **Table A1 summarizes the pulping conditions utilized in this study.**

Metals	1	2	3	4	5
Cr	0.4	0.4	0.3	0.3	1.6
Mn	35.2	50.3	36.3	41.6	39.4
Fe	8.6	6.5	6.8	5.2	11.6
Co	0.2	0.2	0.2	0.2	0.3
Ni	0.3	0.3	0.3	0.3	0.7
Cu	13.3	6.2	7.3	6.4	5.3
Zn	9.3	6.0	5.2	4.1	5.6
Al	1.5	0.7	2.1	1.4	4.2
B	1.4	0.2	0.4	0.1	0.1
Si	6.3	8.5	7.3	4.9	4.8
P	21.7	22.5	22.9	22.1	23.1
S	632.0	618.0	626.0	633.0	534.0
Se	4.0	4.1	4.2	4.1	4.3
As	3.0	3.1	3.2	3.1	3.2
Mo	0.6	0.6	0.6	0.6	0.6
Sn	1.6	1.6	1.6	1.6	1.6
Sb	1.8	1.9	1.9	1.8	1.9
Pb	1.9	2.0	2.0	2.0	2.1
Tl	4.1	4.2	4.3	4.1	4.3
Sr	6.0	3.2	5.8	3.6	5.2
Ba	4.6	2.2	6.5	2.4	4.2
Na	0.7	6.4	2.4	9.9	0.8
Mg	239.0	248.0	286.0	260.0	245.0
K	1.5	2.1	1.3	4.0	1.7
Ca	1760.0	1080.0	1790.0	1190	1590.0

Metals	6	7	8	9	10
Cr	0.7	0.3	0.5	0.3	0.6
Mn	55.2	57.6	61.1	38.0	63.6
Fe	8.0	5.6	8.5	5.3	7.8
Co	0.2	0.2	0.2	0.2	0.2
Ni	0.3	0.3	0.3	0.3	0.3
Cu	4.0	4.8	5.1	3.6	4.7
Zn	5.8	7.4	5.9	6.8	6.6
Al	1.0	4.9	3.0	2.7	1.6
B	0.1	0.1	0.1	0.1	0.1
Si	6.5	6.8	5.6	8.8	8.3
P	22.1	22.0	21.8	22.3	22.0
S	531.1	574.0	725.0	612.0	706.0
Se	4.1	4.1	4.0	4.1	4.1
As	3.1	3.1	3.1	3.1	3.1
Mo	0.6	0.6	0.6	0.6	0.6
Sn	1.6	1.6	1.6	1.6	1.6
Sb	1.8	1.8	1.8	1.9	1.8
Pb	2.0	2.0	1.9	2.0	2.0
Tl	4.1	4.1	4.1	4.2	4.1
Sr	2.8	4.8	3.7	6.2	3.4
Ba	2.5	4.5	2.7	5.5	2.6
Na	1.5	0.7	9.6	0.7	10.3
Mg	252.0	272.0	286.0	244.0	284.0
K	1.3	2.2	1.3	2.6	1.8
Ca	980.0	1430.0	1220.0	1840.0	1110.0

Metals	11	12	13	14	15
Cr	0.7	0.4	0.6	0.5	0.3
Mn	54.7	59.2	60.4	53.2	49.8
Fe	7.9	8.1	7.9	6.4	8.3
Co	0.2	0.2	0.2	0.2	0.2
Ni	0.3	0.3	0.3	0.3	0.3
Cu	4.6	4.3	5.1	4.6	5.6
Zn	5.6	6.2	8.0	6.9	5.6
Al	1.7	4.1	1.5	1.1	3.1
B	0.1	0.1	0.1	0.1	0.1
Si	5.9	5.2	7.9	5.3	5.3
P	22.3	22.7	22.4	21.2	21.8
S	564.0	653.0	723.0	576.0	593.0
Se	4.1	4.2	4.3	3.9	4.0
As	3.1	3.2	3.1	3.0	3.1
Mo	0.6	0.6	0.6	0.5	0.6
Sn	1.6	1.6	1.6	1.5	1.6
Sb	1.9	1.9	1.9	1.8	1.8
Pb	2.0	2.0	2.0	1.9	1.9
Tl	4.2	4.2	4.2	4.0	4.1
Sr	3.8	4.0	4.4	3.5	3.8
Ba	4.0	7.0	3.3	4.7	4.4
Na	0.7	0.7	3.1	0.7	1.6
Mg	267.0	265.0	304.0	251.0	260.0
K	2.8	1.9	3.1	1.8	4.0
Ca	1230.0	1230.0	1430.0	1120.0	1160.0

Metals	16	17	18	19	20
Cr	1.4	0.6	0.4	0.3	0.4
Mn	48.1	52.4	49.5	53.3	65.8
Fe	10.5	7.3	7.4	6.7	5.3
Co	0.2	0.2	0.2	0.2	0.2
Ni	0.6	0.3	0.3	0.3	0.3
Cu	7.6	4.4	5.1	5.0	6.3
Zn	7.5	5.9	6.3	5.5	6.3
Al	2.5	1.9	1.6	2.5	6.5
B	0.1	0.1	0.1	0.1	2.9
Si	6.5	6.6	6.2	6.8	5.1
P	21.6	21.8	21.7	21.4	23.0
S	628	640.0	588.0	635.0	698.5
Se	4.0	4.0	4.0	3.9	4.2
As	3.0	3.1	3.0	3.0	3.2
Mo	0.6	0.6	0.6	0.6	0.6
Sn	1.5	1.6	1.6	1.5	1.6
Sb	1.8	1.8	1.8	1.8	1.9
Pb	1.9	1.9	1.9	1.9	2.0
Tl	4.0	4.1	4.1	4.0	4.3
Sr	4.2	4.0	3.6	4.0	4.8
Ba	3.5	2.9	7.2	3.4	4.0
Na	3.3	5.3	1.1	5.2	27.7
Mg	272.0	272.0	240.0	273.0	319.8
K	2.0	2.5	3.4	2.4	4.1
Ca	1200.0	1270.0	1120.0	1230.0	1380.0

Table A1. Kappa 30 SW pulps Cooking Conditions.

Condition	EA % as Na₂O	Sulfidity % as Na₂O	Maximum Temperature	H-Factor
1	16.0	30.0	165.0	1294
2	20.0	30.0	165.0	790
3	16.0	50.0	165.0	929
4	20.0	50.0	165.0	570
5	16.0	30.0	175.0	1294
6	20.0	30.0	175.0	790
7	16.0	50.0	175.0	929
8	20.0	50.0	175.0	522
9	14.6	40.0	170.0	1352
10	21.4	40.0	170.0	565
11	18.0	23.2	170.0	1217
12	18.0	56.8	170.0	646
13	18.0	40.0	161.6	806
14	18.0	40.0	178.4	806
15	18.0	40.0	170.0	806
16	18.0	40.0	170.0	806
17	18.0	40.0	170.0	806
18	18.0	40.0	170.0	806
19	18.0	40.0	170.0	806
20	18.0	40.0	170.0	806