

Effect of Dust and Fines in Wheat Straw on Yield and Quality of Bleached Pulp With Higher Dosage of Elemental Chlorine in Chlorination Stage

Sharma S.K., Bhargava K.S., and Saxena R.K.

ABSTRACT:— Prevention is better than cure, therefore, it is highly desirable to take out optimum quantity of dust and fines from Agro Cellulosic raw materials before they are put into the digester. Removal of dust and fines before cooking of wheat straw gives high yield of bleached pulp having lower specks and better physical strength properties than that of bleached pulp obtained from Agro Cellulosic raw materials having dust and fines. This will also reduce load on the centri-cleaners. In non-conventional Cellulosic raw materials higher dosage of elemental Chlorine is also advantageous as it is in case of wood and bamboo.

INTRODUCTION

Punjab is blessed with an abundance of wheat straw and other Agro Cellulosic raw materials resources. Constant efforts are being made to make good quality of paper from Agro Cellulosic raw materials at a competitive price. It has been observed that whenever dust and fines percentage increases in wheat straw, fine specks increases in the paper. Pulp Mill crew start giving more attention on the centri-cleaners, but still full success is not achieved to make clean paper. Laboratory experiments were conducted to take out dust and fines from wheat straw before cooking and compare the quality of wheat straw bleached pulp, manufactured from wheat straw having dust and fines and without dust and fines.

EXPERIMENT

Wheat straw was collected from the truck at the time of unloading and was divided into two portions. One portion of wheat straw was screened on 16 mesh to take out dust and fines and were found to be 8.5%. Wheat straw was cooked in experimental digester provided with direct steaming. The cooking of wheat straw with dust and without dust was done under identical conditions which are given in Table I. Bleaching conditions are given in Table II.

Shreyans Industries Limited
(Unit: Shreyans Papers)
AHMEDGARH-148 021
(Distt. Sangrur), Punjab

60 GSM hand sheets were made from bleached pulp for evaluation of physical strength properties of bleached pulp. The test results obtained are also given in Table III. In Chlorination stage, the quantity of elemental Chlorine was added to wash the unbleached pulp at 40%, 50% and 60% of total available Chlorine demand for bleaching the unbleached pulp to 80% brightness by Calcium Hypochlorite.

Table-I

Cooking Conditions

1.	Cooking chemicals as NaOH - 12.5% on O.D. Raw material
2.	Bath ratio - 1 : 3
3.	Cooking temperature - 160°C
4.	Time taken to raise the Temperature to 160°C - 90 minutes
5.	Cooking time at maximum - 2 hrs 30 mts. Temperature of 160°C

Table-II

	Wheat straw with dust and fines			Screened wheat straw		
	A	B	C	a	b	c
1. Residual active alkali in weak black liquor gm/l	1.2			1.2		
2. Unbleached pulp yield%	53.0			57.5		
3. Permagnate number of unbleached pulp	16			15		
4. Percentage of elemental Chlorine taken in Chlorination stage	7.2	9.0	10.8	6.0	7.5	9.0
5. Retention time give in Chlorination stage Minutes	60	60	60	60	60	60
6. Residual Chlorine after Chlorination stage	1.0	1.5	2.4	0.3	0.4	1.03
7. % NaOH added	1.5	1.5	1.5	1.5	1.5	1.5
8. Retention time given to Alkali extraction Minutes	90	90	90	90	90	90
9. % available Chlorine taken as Calcium Hypo Chlorite in Hypo-I stage	6.0	3.8	2.0	5.9	3.8	2.1
10. Retention time given in 1st stage Hypo bleaching	120	120	120	120	120	120
11. Residual Chlorine after 1st stage Hypo bleaching	3.2	1.8	0.5	0.4	2.2	0.92
12. Brightness of bleached pulp	76	75	75.5	78.8	77.3	76.1
13. Physical strength properties of bleached pulp:						
- Burst factor	18	18.9	19.5	23.4	28.4	28.9
- Tear factor	35.8	36.9	37.3	37.0	39.9	41.0
- Length in Mtrs.	2682	2806	2852	3594	3699	3825
14. Cleaniness of Pulp						
				Fine black particles were present	A few black particles were observed	
15. Yield of Bleached Pulp	40				43.2	

Fascinated by the results of removing dust and fines from wheat straw, Shreyans Papers is going to instal modified rotary screen to take out optimum quantity of dust and fines from Agro Cellulosic raw materials with a special attention not to allow any accumulation of rejects below the rotary screen.

RESULTS AND DISCUSSIONS

It has been observed from the test results obtained that the wheat straw free from dust and fines have better yield, consumes less quantity of bleaching chemicals and gives brightness and cleaner bleached pulp of higher physical strength properties than that of wheat straw having dust and fines.

With higher dosage of elemental Chlorine in Chlorination stage, the consumption of Calcium Hypo Chlorite is considerably reduced to get bleached pulp of almost same brightness. The bleached pulp where more quantity of elemental Chlorine is used with low dosage of Calcium Hypo Chlorite, have a better physical strength properties than the bleached pulp of almost same brightness but with higher dosage of Calcium Hypo Chlorite.

CONCLUSION

Optimum quantity of dust and fines from wheat straw should be removed to improve yield and upgrade the quality of bleached pulp.

The cost of bleaching in case of conventional multistages bleaching plant having Chlorination, Alkali extraction, Hypo and Hypo stages can be reduced by the usage of higher dosage of elemental Chlorine in Chlorination stage with lower dosage of Calcium Hypo Chlorite.

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