

The Chemical Dispersion is a Debut in De-inking of ONP/ONB/OMG Using Displector.

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ABSTRACT

Forest depletion prompted us to explore the possibility of waste paper recycling employing an efficient method of de-inking of ONP/OMG with advanced methods of waste paper sorting. NFD of ONP using SCS have been dispersing and collecting action are poised for excelling in the de-inking process at 60 °C temperature. The displector action of hydrophilic-lipophilic SCS anticipated that no need of mechanical disperser using pre-floitation of the de-inking process. Chemical dispersive action of SCS using CSRMP spent liquor separates the inky foam on the surface of the flotation cell anticipate that, the brightness gain 55 to 58% in ONP, 75 to 80% in ONB, 65 to 75% in OMG, reduction in dirt counts with specky waste paper to tolerable dirt counts, in DIP pulp sheets produced by ZcFD process as compared with conventional alkaline de-inking. ZcFD with low caustic low and sodium silicate produced less micro and macro stickies in the final mechanical and chemical based pulp with virgin pulp could save wood, water, energy and chemicals. According to socio-economic concern, recycling of fiber is the only way to manufacture eco-paper; it would claim carbon credits also.

Key words:

NFD (Neutral flotation de-inking), CAFD (Conventional alkaline de-inking), ZcFD (Zero chemical flotation de-inking), ONP (old newsprint Paper), OMG (Old magazine), ONB (Old note books), CSRMP (Cold soda refined mechanical pulp), BSW (Brown stock washer), SCS (sodium cardanol sulphonate), CNSL (Cashew Nut shell Liquid). HLB (Hydrophilic-lipophilic Balance) DIP (De-inked Pulp).

Introduction

With the ecological concern, and rapid decline of available forest resources conservation of raw materials have become increasingly desirable. Coming day's recovered waste paper represents a valuable source of raw materials for the paper industry. Recycling of waste paper such as ONP/OMG requires separating ink from the cellulose fiber without affecting the fiber properties. Recycling means ONP to mix with virgin pulp and made newsprint only not for other products like boards and Kraft paper.

The Mysore Paper mills ltd., is of 300 tpd capacity of Newsprint using 60% mechanical CSRMP and 30% chemical wood pulp and 10% bagasse chemical pulp. CSRMP discharge about 2500 M³ of BSW spent liquor per day. It contains 1000-1500 ppm of lignin, 4-5% residual active alkali and traces of H₂O₂ with high colour, it causes more load on effluent treatment plant. Exploration of R&D laboratory work was carried out to utilize this spent liquor for de-inking of ONP/OMG and waste paper with SCS, CSRMP-BSW spent liquor anticipate the reduction of deinking

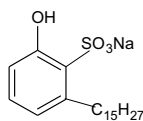
chemicals and enables comparable results obtained by conventional de-inking process.

SCS is a synthesized sulphonated cardanol, which is a decarboxylated and distilled product of CNSL. The bio-degradable SCS is a reddish brown mass, soapy to touch and sparingly soluble in water on thorough shaking it emulsifies. The HLB value of SCS is in between 6-8 shows a good displector action obtained milky dispersion and the surface active action performs a great role in flotation de-inking.

Structure of SCS

Displector action of SCS on fiber during froth flotation process.

The terminal end SO₃Na, polar hydrophilic group attached with phenol



3-(8' (z), 11'(z)) penta deca dienyl phenol sulphonate

group causes dispersion and ease of solubilization in liquid emulsion. The bulk unsaturated long chain at the meta position of the phenol imparts high degree of flexibility water repellency and resistance to corrosion. Displector causes ink and stickies to loosen from the fiber and stick to the air bubbles and

separates inky foam on the surface of the flotation cell and fiber in the form of pulp as such accepted.

De-inking of waste paper is normally carried out at alkaline pH value in the presence of alkali metal hydroxides, silicates, and oxidative/reductive bleaching agents and surfactants at a temperature of 30-40°C and of pH 10-11. Where as NFD using displectors successively obtained a optimum brightness, dirt counts with normal strength properties of the TAPPI pulp sheets accordingly and simultaneously avoids alkali darkening due to low caustic. The dispersive action of SCS acts as a major role in the flotation cell using air bubble. It acts as a mechanical disperser used in pre-floitation of conventional caustic de-inking. The chemical dispersive action sustains the fiber strength there is no damage of fiber and the strength properties of DIP results could also evidenced.

DIP save forest wood, water, energy, it can create more jobs for young generation. Collection of ONP OMG and waste paper from various sources along with sorting, degumming and de-pinning is the assertive work.

Experimental:

De-inking is the process of removing ink particles from waste paper fiber by a combination of mechanical and

chemical action in a pulper. There are several types of chemicals used for de-inking, each one operating on different chemical principles. The types and amount of these chemicals depend on the type of waste paper and the intended use of the recycled pulp and the nature of the de-inking process. The present study on ONP "Deccan Herald", OMG "Today" and ONB were torn into pieces by hand and disintegrated for 30 minutes with 1:9 hot water and

CSRMP spent liquor. The above stock of 1-1.2 % Cy and freeness of about 40-50 ° SR for chemical based pulp and 300-350 CSF for mechanical pulp. The stock subjected to froth flotation using aerator in long measuring jar with conventional and Neutral flotation de-inking with and without SCS was discussed. ONP/ONB/OMG waste paper disintegrated with hot water known as pulp stock, and it was carried out with froth flotation process without

using de-inking chemicals called blank. D-inked pulp stock was made into pulp sheets as per TAPPI standards for measuring brightness (%), dirt counts/m² and strength properties, the values are tabulated in the table No. 4. Stickies also measured by dipping the DIP sheets in 1% aqueous ink solution. Effluent analysis also carried out by IS methods and the results are depicted in the table no. 5.

The above characteristic properties of the CSRMP spent liquor pronounced the de-inking of waste paper was carried out by without using de-inking chemicals like caustic soda and peroxide.

The properties of the pulp analyzed as per TAPPI standard methods, the results obtained repeatedly and average values are tabulated in the table.

Table no. 1
Chemicals used for the de-inking process:

Chemicals	Conventional (CAFD)	Neutral (NFD)	NFD+CSRMP(ZcFD)
Sodium Hydroxide, % w/w	1.0	0.1	NIL
Sodium silicate, % w/w	1.0	0.5	0.5
Hydrogen peroxide, % w/w	1.0	0.5	0.1
pH	10-11	8-8.5	9-10
BSW M ³ /ton	0	0	10-15

Table No. 2
Characteristic properties of CSRMP spent liquor:

pH	10-11
colour	>25,000
Residual active alkali	4—5%
Residual peroxide-	0.05--0.1%
COD (PPM)	>10,000
BOD (PPM)	>2000

Table No. 3
Types of waste paper used and its pulp properties: (Stock)

Pulp Properties	ONP	ONB	OMG
Brightness (%) ISO	50	70	60
Dirt counts/M ²	550	550	550
BL (m)	4600	4200	4400
TF	58	55	60
BF	22	20	24

Table No. 4.
Comparative study of properties of DIP sheets obtained by various de-inking process.

ONP	Pulp Properties	Blank	CAFD	NFD	ZcFD
	Brightness (%) ISO	52	59	59	58
	Dirt counts/M ²	550	280	290	300
	BL (m)	4600	4600	4600	4600
	TF	58	58	58	58
	BF	22	22	22	22
	Stickies/ m ²	10-12	4-6	3-5	3-4
ONB	Pulp Properties	CAFD	NFD	ZcFD	
	Brightness (%) ISO	70	81	80.5	80
	Dirt counts/M ²	550	280	290	300
	BL (m)	4200	4200	4200	4200
	TF	55	55	55	55
	BF	20	20	20	20
	Stickies	8-10	5-6	4-5	4-5

Table No. 5
Effluent Analysis of DIP:

Parameters	Blank	CAFD	NFD	ZcFD
COD (PPM)	200	400	300	300
BOD(PPM)	50	40	60	60
pH	7.5	10-11	8-9	8-9

Results and discussion:

Neutral flotation de-inking minimizes the consumption of chemicals and lowers the pollution load, where as ZcFD consume the BSW spent liquor and it reduces the pollution load and as well as supporting for NFD.

Bio-degradable displector SCSA plays significant role as de-inking aid in NFD, it acts as a chemical disperser by its dispersion action.

The table depicts that the waste paper ONP, OMG, ONB has comparative gain in brightness, reduction in dirt counts as compared with conventional de-inking and blank process.

Reduction in pollution load is also important and major role in de-inking of ONP/OMG/ONB. Significant reduction in COD load in NFD ZcFD as compared with CAFD also, but there is no significant change in pulp yield and strength properties in all the process

Paper industries guzzle 15-16 million tones of wood every year in India, where as de-inking plant could save this much of forests together with chemicals, energy and process water.

ZcFD supports the NFD and it could save water by utilizing BSW spent liquor and also recover the traces of chemicals in the liquor.

Conclusion;

Fiber recycling is the ultimate remedy for conserving raw materials for paper industry by adopting proper de-inking process. De-inking with neutral flotation condition and with using CSRMP spent liquor using biodegradable SCS displector was pronounced. The displector action of SCS is due to its phenolic moieties, which can replace some of the

Fig. 1

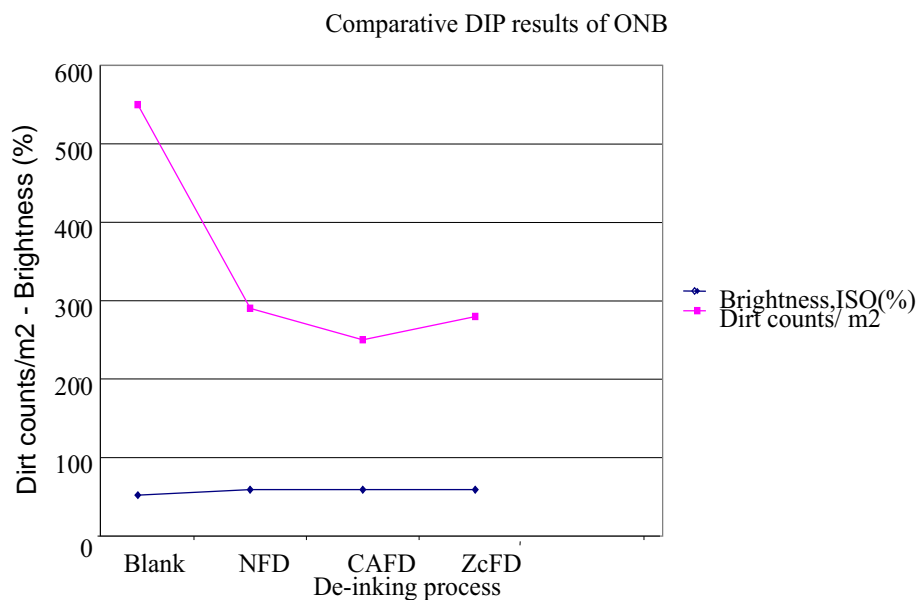
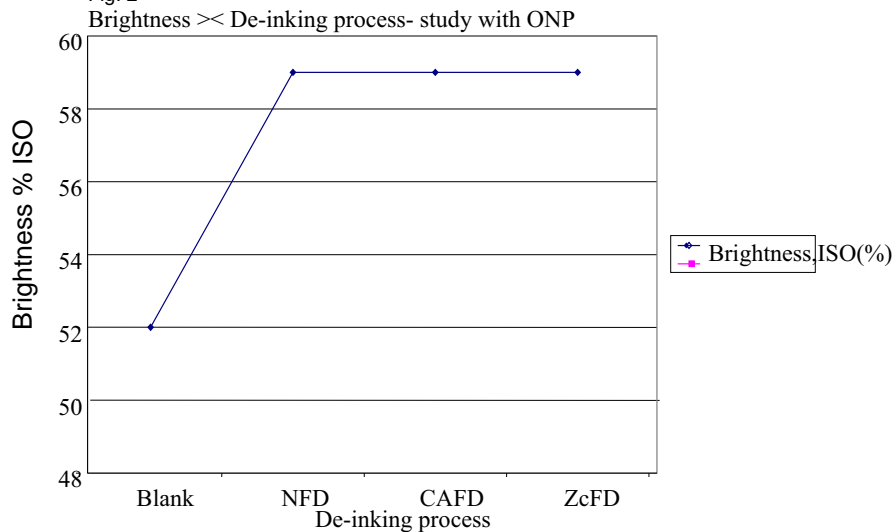


Fig. 2



petrochemical surfactants used. Modern diffused flotation cell encourages the NFD and ZcFD using dislector and BSW spent liquor. ZcFD Could save trees, water, energy and cut down the pollution load on effluent. According to ISO 14001 reutilize the CSRMP (effluent) spent liquor would also envisages water and de-inking properties.

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