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# Review Of Research



## “CHEMICALS USED IN THE PAPER RECYCLING”

Shilpa B. Emmi, Reshma Khuddubai, Netravati B. Sanatti,  
Surayya M. Bukkitagar and Miss Tayyaba Killedar  
Dept of Chemistry, Karnataka state women's University, Vijayapura.

### ABSTRACT:

**P**aper product manufacturing involves a variety of chemicals used either directly in paper and pulp production or in the conversion processes (i.e. printing, gluing) that follow. Due to economic and environmental initiatives, paper recycling rates continue to rise. In Europe, recycling has



increased by nearly 20% within the last decade or so, reaching a level of almost 72% in 2012. With increasing recycling rates, lower quality paper fractions may be included. This may potentially lead to accumulation or un-intended spreading of chemical substances contained in paper, e.g. by introducing chemicals contained waste paper into

the recycling loop. This study provides an overview of chemicals potentially present in paper and applies a sequential hazard screening procedure based on the intrinsic hazards, physical-chemical and bio degradability characteristics of the substance. Based on the result, 51 substances were identified as potentially critical (selected mineral oils, phthalates, phenols, parabens as well as other group of chemicals) in relation to paper recycling. It is recommended that these substances receive more attention in waste paper.

**KEY WORDS:** Paper, Starch, Alum, Rosin, Recycling.

## **INTRODUCTION:**

The process of waste paper recycling involves mixing used paper with water and chemicals to break it down. It is then chopped up and heated, which breaks it down further into strands of cellulose, a type of organic material; this resulting mixture is called pulp, or slurry. It is strained through screens, which remove any glue or plastic that may still be in the mixture then cleaned, de-inked, bleached, and mixed with water. Then it can be made into new recycled paper(1). The share of ink in a waste paper stack is up to about 2% of the total weight(2).

## **EXPERIMENTAL PROCESS:**

Paper chemicals designate the group of chemicals that modify the properties of paper. these chemicals can be used to alter the paper in many ways, including changing its colour and brightness, or by increasing its strength and resistance to water(3) and This process involves following steps;

### **1) PULP PROCESS:**

Under pulp section the raw materials grinded with water made into paste in order to remove like lay steels, plastics, stones etc., by using the chlorine dioxide, hypochlorous acid, and blue and violet dyes etc.

### **2) MOULD SECTION:**

The work of this section is to separate the water from the pulp by using NTP, starch etc. is formed like a fiber mat which consist of 7 layers.

### **3) PRESS SECTION:**

The work of this section is to press the paper board as it comes from the mould section it contains 0% of moisture. The percentage of moisture increases up to third press. It requires the 65% of moisture to heat the paper, hence within four press, the water is removed.

### **4) DRYING AND GLAZING:**

The function of this section is to dry the paper board which consist of 60% of moisture when entering this section it reduce the moisture to 40-50%.

### **5) MG SECTION:**

Under this section whitening of paper is done for strengthening, brightness, and for attractive etc by using the chemicals starch, Titania, Anatase etc.

### **6) POST DRYER:**

It is used to dry the paper. It reduces the moisture 8-10%.

### **7) CALENDER SECTION:**

Calendar this profit and smooth finishing is done like it is made into ruler.

### **8) CUTTER SECTION:**

Here the paper is cut into different sizes.

**9) PACKAGING:**

The company packs the product by using craft paper, rexin-oven sacks are used for packing. Each pack contains maximum 144 sheets.

**10) PRODUCTS AND END USE:**

The company is manufacturing white duplex board and grey duplex board. These are used for food container, medicine boxes etc.

**Chemicals used in the paper recycling process:(5)**

Common Name	Chemical Name	Chemical Formula	Notes
Agalite or Talc	Silicate of Magnesia	$Mg_3O_3Si-32\%, SiO_2-42\%$	It gives paper a greasy or soapy feel. and enables it to take a high finish.
AKD	alkyl ketene dimer	$C_4H_4O_2$	Sizing
Alabaster or Annaline	calcium sulfate (anhydrate)	$CaSO_4$	Paper loading material
algalic acid	algalic acid ("Na-alginate")	$Na-(C_6H_8O_6N$	Coating and surface treatment
alum	"sulfate of alumina"	$Al_2(SO_4)_3 \cdot 18H_2O$	For alkaline sizing along with rosin
albarine	"natural sulfate of lime"	$CaSO_4 \cdot 2H_2O$	building materials.
chlorine dioxide	chlorine dioxide	$ClO_2$	pulp bleaching
chlorine	chlorine	$Cl_2$	pulp bleaching
Dolomite	calcium Magnesium Carbonate	$CaMg(CO_3)_2$	Filler, Coating
DTPA	Diethylene Triamine Penta Acetate	$C_{14}H_{33}N_3O_{10}$	Used for chelation (removal of transition metals from pulp).
EDTA	Ethylene Diamine Tetra acetic Acid	$C_{10}H_{16}N_2O_8$	Used for chelation (removal of transition metals

Enzyme			Used in Deinking
FSA	Formamidine Sulphuric Acid or Thiourea Dioxide	$\text{CH}_4\text{N}_2\text{SO}_2$	Post Deinking bleaching
Guar Gum	Natural Polymer		Dry Strength Additive
Gypsum or Mineral White or Plaster	Natural Sulfate of Lime	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	Gypsum board
Hydrogen Peroxide	Hydrogen Peroxide	$\text{H}_2\text{O}_2$	In Pulp Bleaching
Hypochlorous Acid	Hypochlorous Acid	$\text{HOCl}$	In Pulp Bleaching
Lime	Calcium Oxide	$\text{CaO}$	Alkaline Pulping Process Chemical Recovery, Bleaching
Lime Stone	Calcium Carbonate	$\text{CaCO}_3$	To make Precipitated $\text{CaCO}_3$ , is used as Filler and in Coating
Magnesium Bisulfite	Magnesium Bisulfite	$\text{Mg}(\text{HSO}_3)_2$	Used in Sulfite pulping
Magnesite	Magnesium Carbonate	$\text{MgCO}_3$ -100%	Filler for cigarette paper
Milk of Lime	Calcium Hydroxide	$\text{Ca}(\text{OH})_2$	For causticizing of green liquor
Milk of Magnesia	Magnesium Hydroxide	$\text{Mg}(\text{OH})_2$	

Oxygen	Oxygen	$O_2$	In Pulp Bleaching
Ozone	Ozone	$O_3$	In Pulp Bleaching
Rosin	Abietic Acid	$C_{19}H_{29}COOH$	Sizing
Rosin Soap	Sodium Abietate	$C_{19}H_{29}COONa$	Sizing
Salt Cake	Sodium Sulfate	$Na_2SO_4 \cdot 10H_2O$	Makeup chemical in sulfate pulping chemical recovery ( $Na_2SO_4$ , --- $Na_2S$ )
Soap/ Fatty Acid			Deinking
Sodium Bisulfite	Sodium Bisulfite	$NaHSO_3$	Used in Sulfite pulping
Soda Ash	Sodium Carbonate	$Na_2CO_3$	Makeup chemical in alkaline pulping chemical recovery ( $Na_2CO_3 + Ca(OH)_2$ --- $2NaOH + CaCO_3$ )
Sodium Aluminate	Sodium Aluminate	$Na_2Al_2O_4$	Used in conjunction with alum to control pH
Sodium Bisulfite	Sodium Bisulfite	$NaHSO_3$	An acid type cooking liquor chemical component sometimes used to neutralized residual chlorine in the pulp during the bleaching process.
Sodium Chlorate	Sodium Chlorate(4)	$NaClO_3$	Used to generate Chlorine Dioxide

Sodium Dithionite	Sodium Hydrosulfite	<a href="#">Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub></a>	Bleaching
Sodium Hypo-chlorite	Sodium Hypo-chlorite	<a href="#">Na<sub>2</sub>S<sub>2</sub>O<sub>4</sub></a>	Bleaching
Sodium Peroxide	Sodium Peroxide	<a href="#">Na<sub>2</sub>O<sub>2</sub></a>	Bleaching
Sodium Silicate	Sodium Silicate	Na <sub>2</sub> SiO <sub>3</sub>	In waste paper deinking for wetting, peptization, ink dispersion, peroxide stabilization.
Sodium Sulfide	Sodium Sulfide	<a href="#">Na<sub>2</sub>S</a>	Active chemical in kraft/sulfate cooking liquor
Sodium Thiosulfate	Sodium Thiosulfate	<a href="#">Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub></a>	Bleaching
Sodium tripolyphosphate	Sodium tripolyphosphate	<a href="#">Na<sub>5</sub>P<sub>3</sub>O<sub>10</sub></a>	Dispersant
Starch	Consists of glucose units linked together by oxygen bridges called glycosides	Wet and dry end additive	
Sulfur	Sulfur	S	To make HSO <sub>3</sub> f or bi-sulfite pulping
Surfactant			Used in deinking. Used as debonders in fluff pulp manufacture.
Titania	Titanium Dioxide	TiO <sub>2</sub>	Filler to increase the opacity and brightness of paper. Used in coating.
Anatase	Titanium Dioxide	<a href="#">TiO<sub>2</sub></a>	

**CONCLUSION:**

Recycled paper production processes use significant levels of caustic soda (NaOH) and various bleaches, however, noticeably higher volumes are used in the manufacture of virgin papers. Also, sulphur-based compounds are used in the virgin paper sulphate process, whereas additional soaps and



fatty acids are used in the manufacture of recycled papers.

It can therefore be concluded that the chemicals used in the manufacture of recycled papers have a lower, or at worst similar, environmental impact to those used in the manufacture of virgin paper

#### REFERENCES :

- 1) "How is paper recycledfi"(PDF). TAPPI. Archived from the original(PDF) on 30 november, 2011. Retrived 28 Feb,2012.
- 2) R.McKinney:Technology of paper recycling, 1995,p.351.ISBN9780751400175
- 3) Martin Ragnar, Gunnar Henriksson, Mikael E.Lindstrom, Martin Wimby, Juirgen Blechschmidt, Sabine Heinemann"Pulp" in Ullmann's Encyclopedia of industrial chemistry 2002 Wiley -VCH, Weinheim. doi:10.1002/14356007.a18\_545.pub4
- 4)"The pulp and paper industry, the pulping process and pollutant releases to the environment" (PDF). Office of water. USenvironmental protection agency. 14 Nov,1997.
- 5) Paper chemicals, Wikipidia free encyclopidia.
- 6) www.shreyaspapers.com
- 7) www.google.com

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