

## INVESTIGATION OF THE MECHANICAL PROPERTIES OF PAPER BY BLENDING WITH DIFFERENTS RESIN

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### ABSTRACT

The evidence of growing cooperation between the paper and synthetic polymer industry can be seen from leading a paper making characteristics, and diversifying their manufacturing activities.. In order to improve the durability and Mechanical Strength, Paper can be blended with polymer pigment and Filler. These material increases mechanical properties such as Tensile strength, Bursting Strength, Tearing Strength and Brightness. In this study we observed the improvement in the quality of paper when it is blended with Phenol formal dehyde Resin, Alkyl Resin and Starch. They have been added with different % and sheets were made. The remarkable improvement in the mechanical property have been represented with the help of Bar <sub>m</sub> chart, Graphs and Pie Diagram.

**Key words:-** Alkyd Resin, Binder, Polymer Pigment, Mechanical Property, Blending.

### INTRODUCTION

The objectives of the research are to improve the mechanical properties of Paper by adding the Polymer to the different Pulp Such as, News Paper Pulp and Imported Chemical Pulp. Composite Paper<sup>1, 2</sup> has been prepared by TAPPI Standard method. Then the wood pulp newspaper Pulp and Imported Chemical Pulp is blended with Paper. Using Polyformaldehyde as a Binder. In order to improve the Durability and mechanical Strength of natural fibers Synthetic Polymer, pigments and filler are added. These material increases mechanical properties such as Tear resistance, burst factor, breaking length<sup>4-5</sup> and<sup>8-9</sup> etc. They have been added in different % and sheet was made and observed the remarkable improvement in the mechanical proper-

ties. Main purpose of these researches was improvement in the quality of Paper when it is blended with selective Polyamide Such as Nylon —66 and Poly- formaldehyde resin and gradient like 1 % Starch and alkyl resin. Pulp can be blended with different resin like Phenol formaldehyde, Urea formaldehyde, polyamide (Nylon-66) and Alkyd resin<sup>10</sup> for increasing hydrophobic property. The reaction between phenol and formaldehyde results in electrophilic substitution of the aromatic ring to form a Phenyl alcohol. Phenolic resin is produced by methylation and Condensation. In India several research worker had carried out the work the field of pulp and paper technology by chemical modification. None have given the emphasis on blending technique with adding various additives like polyamide, bake lite, Hexamine and calcium

oxide which acts as binder. So all the reaction study will be more advantageous due to globalization and rapid growth rate of Indian chemical industry (pulp and paper). The scope of the field for improvement of the properties<sup>5-7,9</sup>.

### EXPERIMENTAL METHODOLOGY

A Standard A.R. Grade chemical is required for Analysis of wood Pulp, old News Paper Pulp. And Imported Chemical Pulp. Like 1.0 % Polyester fiber (PF), 1.5 % Polyester fiber (PF), 2.0 % Polyester fiber (PF), 3.0 % Polyester fiber (PF), 1.0 % Alkyl Resin 1.0% Starch A binder of some sort be added because almost complete lacks of bonding of the nylon fiber either with themselves or with cellulose Pulp Fiber. Even with the best of binder the grate dissimilarities in fiber properties do lead to value at certain bleed a levels, which are lower than these of either of the two- homo fiber sheets. The fine fiber are formed by beating cut pieces of Nylon-66 fiber the consistency is similar to beaten wood pulp (till the uniform dispersion of the fiber is observed). The poly formaldehyde resin is used as binder The precaution should

be taken regarding uniformly distribution of polymer fibers. Apparatus Required for Analysis:

1) Slandered Disintegrators 2) Slandered Couch roll 3) Standard Couch Plate 4) Standard Pump 5) Pressure with Pressure Gauge 6) Press template for centering the sheet and plate in the press 7) Freeness Tester 8) Drum dryer for drying Paper Sheet 9) Beater 10) Blotting Paper 11) Graduated Measuring Cylinder 1000 ml.

Procedure: Dilute the sample to 2000 ml (11.2 % consistency) with water at 222°C and disintegrated for 76000 revaluation (3000 on the 25 : 1 center) in the Slandered Integrator with the propeller revalving at 3000 rpm in the stock. After integrate dilute the stock up to 10 liter (0.15 % consistency) with water at 222°C). Beating is necessary and it is carried out in the beating machine.

### OBSERVATION

Chemically and Mechanically modified Paper is tested for different Parameter as per TAPPI Standard and Tabulated in the form of Tables 1 and 2.

**Table-1. Composition of pulp in various sheet (binder and additives) Are prepared as per TAPPI Standard are**

| Sheet | Composition                                        | Additives / Binder   |
|-------|----------------------------------------------------|----------------------|
| 1     | News Paper pulp (NPP) sheet                        | Without Binder       |
| 2     | NPP. Pulp + 1.5 % wt of PF                         | With Binder          |
| 3     | NPP. Pulp + 3.0 % wt of PF                         | With Binder          |
| 4     | Important Chemical. Pulp                           | With Binder          |
| 5     | I. C. Pulp+ 1.5 % of PF + 1.0 % Alkyl Resin        | Binder and Additives |
| 6     | I. C. Pulp + 1.5 % PF + 1 % Starch                 | With Binder          |
| 7     | I.CP. + 1.5 % PF.+ 1.0% Alkyl Resin + 1.0 % starch | With Binder          |

**Table-2. Composition & properties of poly (Amide-imides)**

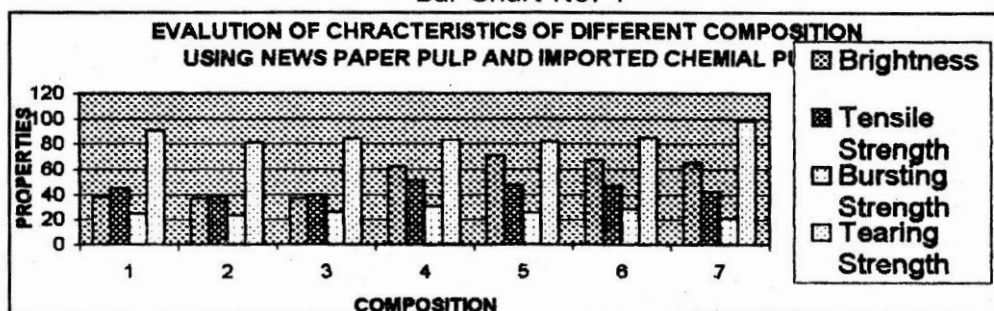
| Sheet | Composition                                 | Additives / Binder   |
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| 3     | NPP. Pulp + 3.0 % wt of PF                  | With Binder          |
| 4     | Important Chemical. Pulp                    | With Binder          |
| 5     | I. C. Pulp+ 1.5 % of PF + 1.0 % Alkyl Resin | Binder and Additives |
| 6     | I. C. Pulp + 1.5 % PF + 1 % Starch          | With Binder          |

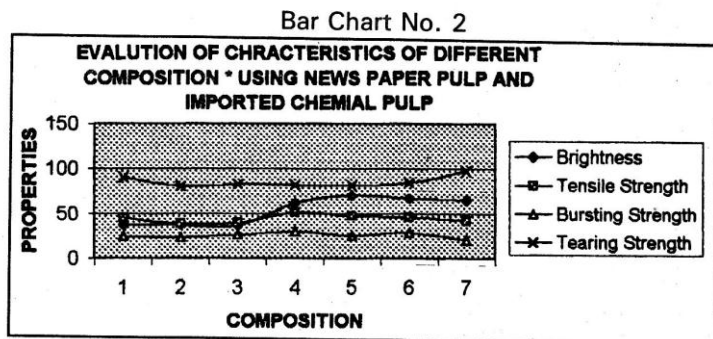
### RESULT AND DISCUSSION

From the table as shown in Table -1. it can be concluded that due to addition of Phenol formaldehyde resin, alkyd resin and Starch the Vital Properties like Brightness, decreases the sheet no 2 and 3 for News Paper Pulp But increases the sheet no 5,6, 7 for Imported Chemical Pulp. However improvement is limited only up to the addition of 1.5 % and 3.0 % of these material and any further increase in the addition shows declination in the properties. This is due the fact that due to the addition of these additives homogeneity of mixture decrease and additive do not wipe well to the Pulp. The most interesting part of the result is the properties shown by news Paper Pulp and Imported Chemical Pulp It shows remarkable decrease in properties like Tensile Strength, Bursting Strength Tearing Strength for the sheet No 2,3,5,6,7 for News Paper Pulp, But in case of Imported Chemical Pulp Bursting Strength

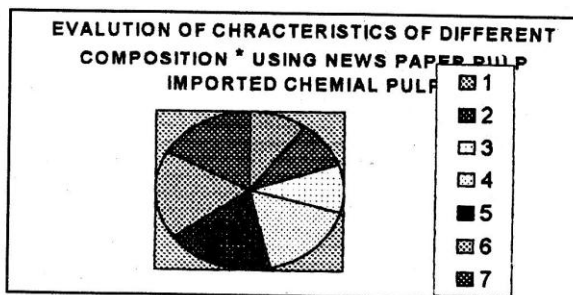
decreases for the sheet No 5 and increases the sheet No 6, 7 This is due to the fact that, in the mixture resin acts as a binder, which causes alignments of both Pulps. The further scope of this work is to try different polymeric material and to find cheap and easily available additive that can improve the properties of paper as desired.

All the parameters are represented by Bar Chart No -1 and their Curve nature is also represented as Graph No - 01 As per Pie Diagram No 01 it is clear that Comparative Performance of Different Composition Sheet in case of New Paper Pulp 1 to 3 and Imported Chemical Pulp 4 to 7 are equally shared by the addition of Phenol formaldehyde Resin, Alkyd Resin and Starch But Their Sharing Distribution is more far Imported Chemical Pulp sheet No 1 to 3 as compared to News Paper Pulp sheet No 4 to 7. Altering the binder can increase the Properties This can save the cost of deinking cell that is proposed to remove the ink of paper.

**Bar Chart No. 1**



Pie-Diagram No. 3 Comparative Characteristics Performance of Different Composition Sheets



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