

What Floats Your Boat?

Linda Werner

Educator, Paper Discovery Center

1. Collect as many different kinds of paper as possible, at least 8.5 x 11.

For example:

Wax paper

Brown paper bag

Sunday funnies

Magazine cover

Magazine page

Fast food wrap paper

Paper menu

2. Using the same pattern, fold each kind of sheet into a flat bottom 'boat' for the experiment. A box pattern will work for this.

3. Using an eyedropper, squeeze drops of water, one at a time.

4. Chart results showing boat material and number of drops until a hole appears in the boat bottom.

Sally: Add science here. Factors can vary depending on age group.

Finishes - wax vs no wax

Fiber source: Hardwood - generally short, tough fibers with less surface area make weak paper without wet strength, good for TP, newspaper. Softwood - longer fibers with collapseable walls add strength to paper.

It's All About the H₂O

Kathy Clark

Hand Papermaking Pioneer, Twinrockers

'Whenever two fibers meet in water - and not in any other substance - one fiber says to the other, 'Hang on!'. There you have the miracle of the hydrogen bond and that's why you can make paper'. Arnold Grummer, Presentation at Smithsonian Institutions

Experiment:

2 blenders

1 filled with water

1 filled with lowest water content rubbing alcohol (Kathy used vodka with adult interns)

Both look the same.

Ask for observations.

What will happen when we run the blender?

Run the blender with water first.

List results.

Why did we get these results?

Run the blender with the rubbing alcohol.

List results.

Why did we get such different results?

Make a sheet of paper with each blender full.

List outcomes.

(Water based pulp will form a usable dry sheet.

Rubbing alcohol based sheet will form a soft mat with little to no strength.

Vodka based sheet won't break down in the blender)

Sally, please add Hydrogen Bonding Science here:

TP, Tissues and Paper Towel

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Paper scientists spend a lot of time engineering paper for specific uses by consumers and companies.

TP vs Tissues vs Paper Towel:

What are the differences between them?

What would happen if someone switched the rolls and put TP in the kitchen and Paper Towel in the bathroom? What if we only had tissues to use for everything?

Discovering wet strength:

1. Bring in a variety of rolls of TP, Kleenex and paper towels.
2. Chart roll weights and dimensions
3. Chart perped (section) size, dimension and weight.
4. Note description on wrapper or roll

Suspend a sheet at a time between clips on two stationery posts.

Drip one eyedropper of water into the middle of the suspended product section.

Gently place a washer or other weight onto the wet spot in each product

Chart the number of washers each product will hold until the washers fall through.

Why is wet strength an important factor in the design of paper products?

Sally, please add paper science

The Mullen Test

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Paper is sold in reams. Research ream labels at a local office supply store, or print out 'paper ream' choices from a paper supply resource such as www.thepapermillstore.com.

Snap an image or print out description on ream labels.

Make a chart including:

Paper weight: ie 20lb, 80 lb etc

Ream dimensions

Ream count

Record suggested use for each ream if it's listed or available.

Rig a simple Mullen tester:

Clip one end of a sheet of paper to a stationery post.

Clip the other end to a thread and scale.

Add weight incrementally to the scale.

Find the weight at which the paper tears.

Chart results for each sheet 'weight' listed on the product label.

Paper scientists use the Mullen Test to determine paper's 'tear strength'. Why does tear strength matter?

Sally, please add paper science here