

● ○ ○ EASY



5 – 11 YRS



2 – 3 HRS



1

Learn about the history of paper making

2

Make your own recycled paper

3

Discover how scientists can make high quality paper without cutting down trees

INNOVATION IN CHEMISTRY

PRETTY PULPY RECYCLED WRAPPING



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INTRODUCTION

Two thousand years ago in China, the first true paper was made using mashed up Mulberry plant stems mixed with old fishing nets and rags to give it strength.

A thousand years ago, European books were still being made using stretched animal skins. By the 1200s, Europeans were starting to use cotton and linen fibres to make paper in waterwheel powered factories. In 1588, Britain's first paper mill factory was built in Kent.

In 1841, a German scientist called Friedrich Gottlob Keller started using wood chippings to make good quality, affordable paper. The process has not changed too much since then. The wood is chipped and then mashed into a smooth mixture (wood pulp). The mixture is then washed and bleached white using chemicals, before being pressed, rolled into fine sheets and dried sheets.



SAFETY

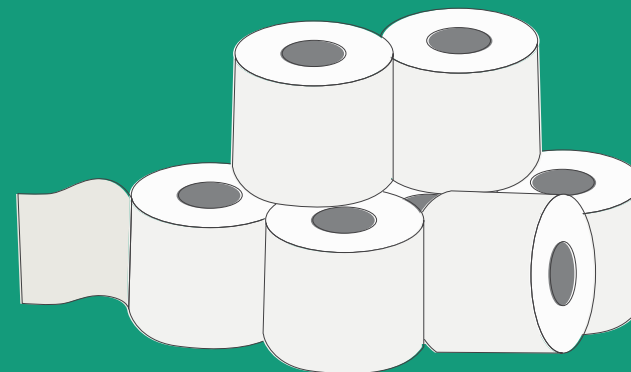


This experiment can get messy. It is best carried out on a washable floor or outside.



DID YOU KNOW?

If all toilet paper was made from new wood pulp, we would need to cut down 12 million more trees every year to make the toilet paper used in an average year. In Britain, those trees would take up the same amount of land as 318 London Wembley stadiums. If everyone who lived in Britain switched to using recycled toilet paper for just one day, we could save 33,330 trees.



References: David Buisseret (1998), *Envisaging the City*, U Chicago Press, p. 12 – Chinese paper making

drive.google.com/file/d/1IOBDcixSgD5Lgz2gT3UmPb0i4E1v14bs/view – see sections 3.2 and 4.3 for 'Did You Know' facts

ACTIVITIES

MAKING RECYCLED PAPER INSTRUCTIONS

1. Remove all glitter, tape and staples from the paper before starting. Tear the paper into long narrow strips and place it in the washing-up basin.
2. Add warm water to the washing-up bowl of finely torn up paper until the water just covers the paper strips. Soak the paper strips for 30 minutes and thoroughly mash up the paper until it is as smooth as possible.
3. Place the colander/large sieve in a sink and line it with the cloth. Slowly pour the mashed-up paper into the cloth until the cloth is full of liquid. Gather up the corners of the cloth and squeeze to strain out all the water until you are left with a ball of paper pulp.
4. Line the base of the baking tray with about 1cm thickness of old newspaper. Cover the newspaper with a few sheets of kitchen roll to prevent sticking. Transfer the ball of strained paper pulp from step 4 onto the kitchen roll layer. Keep adding balls of strained pulp until all the mashed pulp has been strained and transferred.
5. Using your hands, spread the mashed pulp across the whole surface of the kitchen roll and pat down to make a thin layer. Place the cloth on top and then add another 1cm layer of newspaper to the top of the cloth and place the chopping board on top. Press down hard or stand on the board for 5 minutes.
6. Turn over the baking tray, and pat firmly. Gently lift off the baking tray and peel off the top layers of newspaper and kitchen roll to reveal the flat sheet of recycled paper. Transfer the chopping board with the newspaper, cloth and the paper sheet to a warm place and leave overnight to dry.



CHALLENGE

Experiment with using smaller strips of paper in **step 1**, and mashing the paper to the smoothest pulp you can. Does smoother pulp make better paper? You could also try adding a little food colouring or dried flowers to the pulp, or lining the baking tray with textured material instead of kitchen towel to see which colours and textures you can make.

YOU WILL NEED

- Scraps of old wrapping paper or magazines, enough to fill a supermarket carrier bag when scrunched up
- A washing-up basin / large bowl
- A potato masher
- A large sieve, colander or bowl
- A kitchen cloth / old tea towel
- A large rectangular baking tray
- A chopping board that fits inside the baking tray
- Kitchen roll
- Old newspapers
- Scissors



WHAT'S HAPPENING?

Tearing up the paper into small pieces, soaking it and mashing it releases cellulose fibres. Cellulose is the chemical name for the long fibres in plant material like wood and stems. The best quality paper contains lots of cellulose, so the plant material is boiled, and mashed into a very smooth pulp mixture before being spread into thin sheets and dried.

Making new paper requires trees to be cut down as well as using lots of water and bleaching chemicals. Innovations in the paper making process has allowed scientists to recycle wastepaper to make new paper without cutting down trees. Recycled paper can be used to make toilet rolls, paper, food containers and even paper straws. About a third of all paper materials are now made from recycled paper. Scientists have also invented ways to make eco-friendly paper with fast-growing plant materials such as wheat straw and bamboo.