

5. Pulp to paper



2
hours

Children make recycled paper from newspaper by following the recycling process. They consider the forces involved and the efficiency.

OBJECTIVES

- To make recycled paper out of waste paper.
- To investigate forces involved in paper recycling.

RESOURCES

(Per group of 4 children unless otherwise stated)

- Activity sheets 13 – 14 (each group to have a different activity sheet)
- Waste paper e.g. newspaper
- Water
- Wooden spoon and/or whisk
- Food colouring
- Kitchen cloth, clean and absorbent Gauze sheeting
- Bucket or basin
- 2 wooden boards or baking trays
- Weights
- Aprons

ADVANCE PREPARATION

The process of breaking apart the fibres will be much more successful if the shredded paper is allowed to soak overnight.

INTRODUCING THE ACTIVITY

Look at Activity sheet 14 and talk through the process of recycling paper. Highlight the fact that similar processes are used in the recycling of many different materials. i.e. sorting – shredding – processing – finishing. Look at www.recyclenow.com/fun_stuff for video of the paper recycling process.

MAIN ACTIVITY

Provide Activity sheet 13 and the other materials. In groups, the children follow the instructions to recycle newspaper.

Ask the children to think about the different stages of the recycling process and the forces involved while they are making the paper, e.g. the separating of impurities, magnetism, the shredding, beating, removal, pressing, etc.

Explain that colour is added to cover the ink and also that some recycling plants clean off the ink or use bleach to remove it. Further steps would then be taken to recover the bleach and prevent it from becoming a pollutant.

PLENARY

Collect children's feedback about the recycling paper activity. Discuss any problems in the process.

Ask questions like:

- Did the paper break down enough to form a pulp?

If the paper being recycled is not shredded very finely there will be less chance of a uniform pulp being created.

- Did some parts of the process take longer than others?
- How might this affect the recycling on an industrial scale?

The materials would mount up at various stages. Design of the process may allow for larger quantities to be processed at some stages or storage may be needed. Sometimes there is more waste than sites can deal with, thus creating a waste mountain.

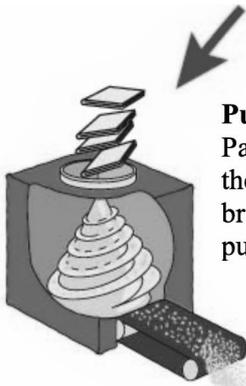
Give the children the opportunity to look at the listed websites in [Appendix 2](#), showing the recycling processes of glass, steel aluminium and plastic. This could be an independent or whole class activity. Compare these processes to the recycling of paper.

EXTENSION ACTIVITY

Create a paper recycling treatment plant. Each group takes on the role of a different stage in the recycling process:

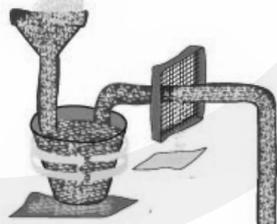
- Sorting
- Shredding
- Extracting steel/iron with magnets (this may not be a major task in your classroom simulation)
- Pulping
- Dyeing
- Extracting the water

The diagram below shows part of the recycling process taken from the poster Paper Recycling Works which can be found at <http://www.paperretriever.com/>.



Pulper

Paper is delivered to a mill and sent through a pulper. In the pulper warm water and chemicals cause the papers to break apart into small fibres. We call this mix a pulp. The pulp has the consistency of thick porridge.

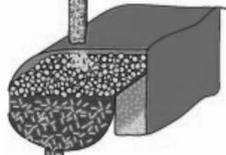


Cleaners and Screens

The pulp then goes to cleaners that use a centrifugal force to remove large ink particles and debris. A series of screens placed throughout the process to remove other foreign materials.

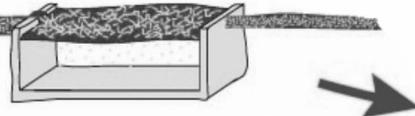
Flotation Cells

In the flotation cells, soap and air are used to form a froth that floats the medium sized ink particles to the top for removal.



Washing

The pulp is washed by moving it over fine screens, which remove the remaining ink and contaminants.



Appendix 2

The table below shows useful websites with information relevant to the unit.

Website	Details
https://uk.emrgroup.com/	The European Metal Recycling website has animations of the processes of shredding, flotation (to separate materials) and dismantling and recycling a fridge.
http://www.scrib.org.uk/	This is the Steel Can Recycling Information Bureau website. It contains information for teachers as well as activities for children. Free posters and videos are available for schools.
https://www.sustain-education.org/	Although aimed at secondary school use this CIEC website contains useful information about the recycling of different materials and provides other links.
https://thinkcans.net/	This Novelis aluminium recycling education website contains information, interactive games, activity sheets and teachers' activity ideas.
https://www.wastecare.co.uk/	This is a website encouraging more recycling and gives information about all types of recycling.
https://www.recycle-more.co.uk/	This is another website encouraging recycling with other activity ideas and games.
https://wrap.org.uk/	Useful research site.